

NEC

MODELS

MultiSync 75F-3

AccuSync 75F-3

(N0701-3)

COLOR MONITOR

SERVICE MANUAL

Better Service

Better Reputation

Better Profit

NEC/MITSUBISHI

NEC-MITSUBISHI ELECTRIC VISUAL SYSTEMS



WARNING

The SERVICE PERSONNEL should have the appropriate technical training knowledge and experience necessary to :

- Be familiar with specialized test equipment, and
- Be careful to follow all safety procedures associated with high voltage CRT circuit designs to minimize danger to themselves and their coworkers.

To avoid electrical chocks, this equipment should be used with an appropriate power cord and be connected only to a properly grounded AC outlet

This equipment utilized a micro-gap power switch. Turn off the monitor by first pushing the front panel power switch. Next, remove the power cord from the AC outlet.

To prevent fire or shock hazards, do not expose this unit to rain or moisture



This symbol warns the personnel that un-insulated voltage within the unit may have sufficient magnitude to cause electric shock.



This symbol alerts the personnel that important literature concerning the operation and maintenance of this unit has been included. Therefore, it should be read carefully in order to avoid any problems.



PRODUCT SAFETY CAUTION

1. When parts replacement is required for servicing, always use the manufacturer's specified replacement.
2. Comply with all caution and safety-related notes on the product display chassis and picture tube.
3. When replacing the component, always be certain that all the components are put back in the place.
4. When servicing display monitor unit, it is required that the provided lead dress is used in the high voltage circuit area.
5. It is also recommended that shatter proof goggles are worn, when removing, installing and handling the picture tube. People not equipped with the proper precautionary measures mentioned should keep the picture tube away from body while handling.
6. As for a connector, pick and extract housing with fingers properly since a disconnection and improper contacts may occur, when wires of the connector are led.
7. Use a proper screwdriver. If you use screwdriver that does not fit, you may damage the screws.

CONTENTS

	Page No.
PRECAUTIONS	1
SPECIFICATIONS	3
PIN ADJUSTMENT TABLE	4
CONTROLS	5
ON-SCREEN MANAGER(OSM)	6
SERIAL NUMBER INFORMATION	11
DISASSEMBLY	12
ADJUSTMENT PROCEDURES	13
WRITE AND INSPECTION FOR PLUG AND PLAY COMMUNICATION	26
TROUBLE SHOOTING	29
CIRCUIT DESCRIPTION	37
REPLACEMENT PARTS LIST	80
BLOCK DIAGRAMS	98

Precautions

Follow these safety and servicing precautions to prevent damage and to protect against potential hazards such as electrical shock and X-rays.

1.1 Safety Precautions

1-1-1 Warnings

1. For safety purpose, do not attempt to modify the circuit board, and always disconnect the AC power before performing servicing on the monitor.
2. Operation of the monitor outside its cabinet or with the cover removed involves the risk of shock hazard. Repair work on the monitor should only be attempted by service personnel who are thoroughly familiar with all necessary safety precautions and procedures for working on high voltage equipment.
3. Do not lift the CRT by the neck. After completely discharging the high voltage anode, handle the CRT only when wearing shatterproof goggles. Try to keep the CRT away from the body during handling.
4. High voltage should always be kept at the rated value, no higher. Only when high voltage is excessive are X-rays capable of penetrating the shell of the CRT. Operation at high voltages may also cause failure of the CRT or high voltage circuitry.
5. The CRT is especially constructed to limit X-ray emission to 0.5mR/HR at 300 microamperes anode current. To ensure continued X-ray protection, replace the CRT with only the same or equivalent type as the original, and adjust the anode's voltage to the designated maximum rating, never to exceed.

1-1-2 Safety Checks

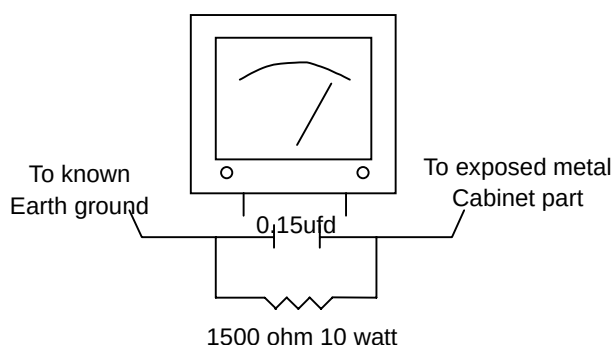
Before returning the monitor to the user, perform the following safety checks:

1. Inspect to make certain that each lead dress is not pinched or that hardware is not lodged between the chassis and other metal parts in the monitor.
2. Inspect all protective devices such as nonmetallic control knobs, insulating materials, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacitor networks, mechanical insulators, etc.
3. AC Leakage Current Check

Always perform the AC Leakage Current Check on the exposed metal parts, including metal cabinets, screwheads and control shafts, as follows:

- a) Plug the AC line cord directly into a rated AC outlet. Do not use an isolation transformer during the check.
- b) Use an AC voltmeter with at least 5000 ohms per volt sensitivity as follows:
Connect a 1500 ohms, 10 watt resistor paralleled by a 0.15uF AC capacitor in series with all exposed metal cabinet parts and a known earth ground, such as electrical conduct or electrical ground connected to earth ground, as shown in the Figure 1-1. Measure the AC voltage across the combination of resistor and capacitor.

Figure 1-1. Set Up For AC Leakage Current Check



- c) Reverse the AC plug at the AC outlet and repeat the steps for AC voltage measurements for each exposed metal part.
- d) Voltage reading must not exceed 0.3 volts RMS, equivalent to 0.2 milliamperes AC. Any value exceeding this limit will constitute a potential shock hazard and must be corrected immediately.

1-1-1 Product Safety Notices

Many electrical and mechanical parts in this chassis have special safety-related characteristics which are often not evident from visual inspection. The protection afforded by them may not be obtained by replacing them with components rated for higher voltage, wattage, etc. Before replacing any of these components, consult the Recommended Spare Parts List given at the end of this manual. Any of the replacements that do not provide the same safety characteristics may result in shock, fire, X-ray emission or other hazards.

1.2 Servicing Precautions

Warning: An electrolytic capacitor installed with the wrong polarity might explode.

Caution: Before performing servicing covered by this service manual, read and follow the Safety Precautions section of this manual.

Note: If unforeseen conflict between the following servicing precautions and of the safety precautions, always follow the safety precautions.

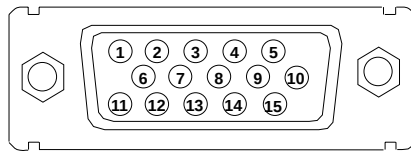
1. Follow closely the servicing precautions printed on the monitor cabinet and chassis.
2. Always unplug the AC power cord from the AC power source before removing or installing any component or assembly, disconnection PCB plugs or connectors and connecting a test component in parallel with a capacitor.
3. When replacing parts or circuit boards, clamp the lead wires around the unit before soldering.
4. When replacing a high wattage resistor (>0.5W metal oxide film resistor) in the circuit board, keep the resistor about 1 cm (1/2 inch) away from the circuit board.
5. Keep wires away from the high voltage or high temperature components.
6. Keep wires in their original positions so as to minimize interference.
7. Always connect a test instrument's ground lead to the instrument chassis ground before connecting the positive lead; always remove the instrument's ground lead last.

Specifications

Monitor Specifications	MultiSync 75F AccuSync 75F	Notes
Picture Tube Viewable Image Size: 41cm(16inch)	Diagonal: 43cm(17inch)	90° deflection, 0.25mm trio dot pitch, medium short persistence phosphor, multi-layered, anti- static screen coating, semi-tint screen, Invar Shadow Mask and OptiClear screen. (AS75F: 0.24-0.28 mm variable(diagonal) flat dot pitch, 0.20-0.25 mm variable(horizontal) flat dot pitch.)
Input Signal	Video: ANALOG 0.7Vp-p/75 Ohms Sync: Separate sync. TTL Level Horizontal sync. Positive/ Negative Vertical sync. Positive/Negative (MS75F: Composite sync. (Positive/Negative) (TTL Level)	
Display Colors	Analog input: Unlimited number of Colors	Depends on display card used.
Synchronization Range	Horizontal: 31 kHz to 70 kHz Vertical: 55 Hz to 120 Hz	Automatically Automatically
Resolutions Supported Resolution based on horizontal and vertical frequencies only	640 × 480 @ 60 to 120 Hz 800 × 600 @ 55 to 110 Hz 832 × 624 @ 55 to 106 Hz 1024 × 768 @ 55 to 87 Hz 1152 × 870 @ 55 to 77 Hz 1280 × 1024 @ 55 to 66 Hz	Some systems may not support all modes listed. NEC-Mitsubishi Electronics Display cites recommended resolution at 85 Hz for optimal display performance.
Active Display Area (Factory Setting)	Horizontal: 310 mm/12.2 inches Vertical: 232 mm/9.1 inches	Dependent upon signal timing used, and does not include border area.
Active Display Area (Full Scan)	325 mm/12.8 inches 243 mm/9.6 inches	Dependent upon signal timing used, and does not include border area.
Power Supply	AC 100 - 240V, 50 - 60Hz	
Current Rating	1.5A @ 100 - 240V	
Dimensions	403(W) × 420(H) × 420(D) mm 15.9(W) × 16.5(H) × 16.5(D) inches	
Weight (Net)	16.4 kg 36.8 lbs	
Environmental Considerations	Operating Temperature: 0° C to + 35° C Humidity: 30% to 80% Altitude: 0 to 3000 m Storage Temperature: -20° C to + 60° C Humidity: 10% to 90% Altitude: 0 to 13700 m	

NOTE: Technical specifications are subject to change without notice.

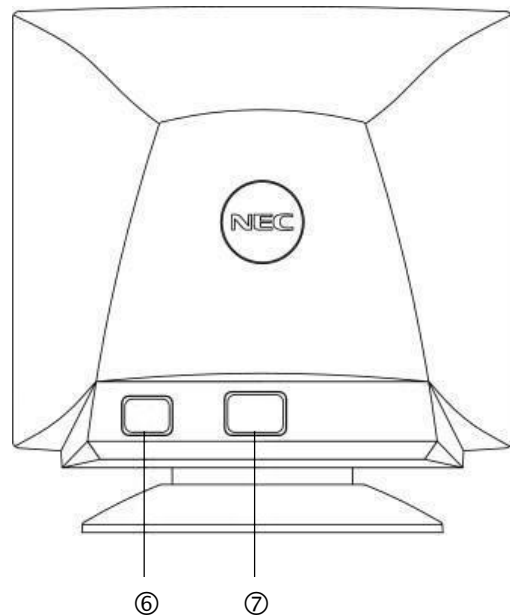
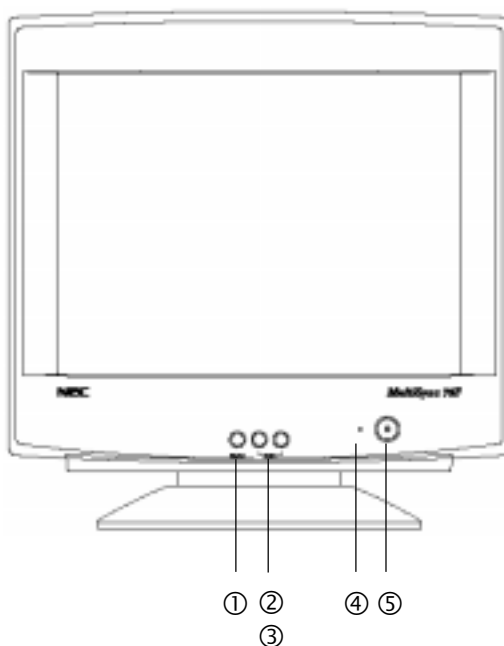
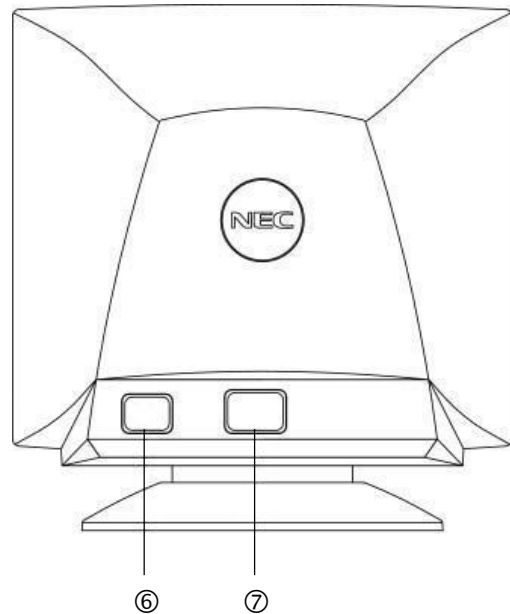
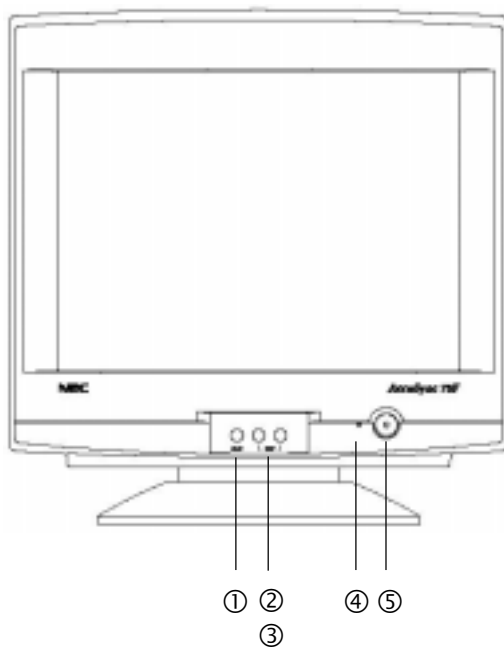
PIN ASSIGNMENT



PIN NO.	Mini D-SUB-15P
1	RED
2	GREEN
3	BLUE
4	GROUND
5	GROUND
6	RED GROUND
7	GREEN GROUND
8	BLUE GROUND
9	+5V in
10	GROUND
11	GROUND
12	SDA
13	H.SYNC.
14	V.SYNC.
15	SCL

CONTROLS

- ① "SELECT": To display OSM windows, mode changes, or activate the degaussing or OSM window color selection.
- ② CONTROL BUTTON (-,+): Without OSM — Adjust the contrast.
With OSM — Select icon and adjust.
- ③ "RESET": Return the adjustment item to the factory setting.
- ④ Power indicator LED: The LED indicate Power management state.
- ⑤ POWER SWITCH: Push/push to turn the monitor on and off.
- ⑥ Power input: To connect with the power cord.
- ⑦ Signal input with the captive cable: To connect with personal computers' analogue RGB output.



OSD OPERATION

- FUNCTION VALUE ADJUSTMENT

If OSD off, press UP key to increase Contrast value,

press DOWN key to decrease Contrast value.

press SELECT key to display OSD and Brightness icon is active (Fig. 1)



Fig. 1

Press UP key or DOWN key to select icon right or left and the selected icon display red color

If selected icon is DAC out, press SELECT key will display DAC value bar (fig 2)



Fig. 2

User can press UP key or DOWN key to adjust DAC value.

Press SELECT key to close DAC value bar and UP key or DOWN key to select the other icon.

- SPECIAL FUNCTION OPERATION

1. Degauss Active

If selected icon is degauss icon, press SELECT key to activate degauss (Fig. 3).



Fig. 3

2. Color Temperature Select

If selected icon is 9300/7500/6500/user color icon, press SELECT key to select Color Temperature for 9300, 7500, 6500 or user defined (Fig 4 – 7).



Fig. 4



Fig. 5



Fig. 6



Fig. 7

3. OSD Color Select

If OSD icon is selected, press SELECT key to change OSD color, there are three kinds of OSD color can be selected (Fig. 8 – 10).



Fig. 8



Fig.9



Fig. 10

Background	white	blue	black
Action icon	red	red	red
Normal icon	black	white	white
Value bar	blue	yellow	green

4. SYNC OSD Display

If EXIT icon is selected, press SELECT key to close OSD menu and then display sync information for 2 sec. This sync information will not be close until release SELECT key (Fig. 11).

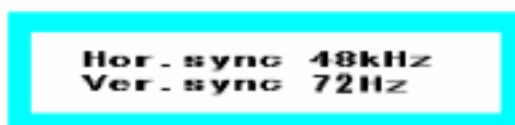


Fig. 11

5. Factory mode

Press SELECT key + UP key and power on, system enter factory mode.

OSD will display "FA" to indicate in factory mode (Fig. 12 – 13).



Fig. 12



Fig. 13

Operation of factory mode is same as normal mode except below 2 condition:

- Adjustment value is saved to user and factory area.
- R, G, B value are saved to current color temperature.

P2

Self Test Pattern Select

P1: Full White Pattern

P2: Cross Hatch Pattern

NP: No Pattern (Power Saving)

SS

Sub Size Do not adjust.



OSD Position H



OSD Position V

VL

Vertical Linearity IN ↔ OUT

VB

Vertical Linearity Balance Top ↔ Bottom

HM

Horizontal Moire: Minimum

VM

Vertical Moire: Minimum

HC

Side Pin Corner

HF

Horizontal Dynamic Focus: Min

VF

Vertical Dynamic Focus: Max

AB

ABL Adjustment

Function explanation

OSD(On-screen Display) control buttons on the front of the monitor function as follows:

SELECT Enters and exits the OSD menu.

-/+ Selects one of the controls and increases or decreases the adjustment.

RESET Resets the highlighted control to the factory Setting.
Press -/+button at the same time for approximately 1 sec.



Brightness: Adjusts the overall image and background screen brightness.



Contrast: Adjusts the image brightness in relation to the background.
(Contrast control is also effective with “-, +” button even through OSD window is not visible.)

R

Red Color Control: Adjust the red contrast of the display.

G

Green Color Control: Adjust the green contrast of the display.

B

Blue Color Control: Adjust the blue contrast of the display.



Horizontal position: Moves the image horizontally left or right.



Vertical position: Moves the image vertically up or down.



Horizontal size: Decreases or increases the horizontal size of the image.



Vertical size: Decreases or increases the vertical size of the image.

The **Geometry** controls allow you to adjust the curvature or angle of the sides of your display.



Pincushion/Barrel: Decreases or increases the curvature of the sides either inward or outward.



Trapezoid: Decreases or increases the bottom of the screen to be the same as the top.



Parallelogram: Decreases or increases the tilt of the sides either to the left or right.



Bow (Pincushion Balance): Decreases or increases the curvature of the sides either left or right.



Rotation: Rotate the image.



Degauss: Select the degauss icon on “Icon select window” and push “SELECT” button.
It will eliminate the stray magnetic field and correct the scan of the electron beam, which affect the purity, focus, convergence.

Note: Allow a minimum interval of 20 minutes to elapse between uses of the degauss function.

9300K Color Temperature: Select the Color Temperature icon on “Icon Select Window” and push “SELECT” button.



OSD: There are 3 background colors (Blue, Black, and white). These can be selected by “SELECT” button after the selection of “OSM” on “Icon select window”.



EXIT: To exit the OSM window. Select EXIT on “Icon select window”, then push “SELECT” button.

Note: If you do not push buttons within 10 seconds in OSD condition, the window will automatically disappear.



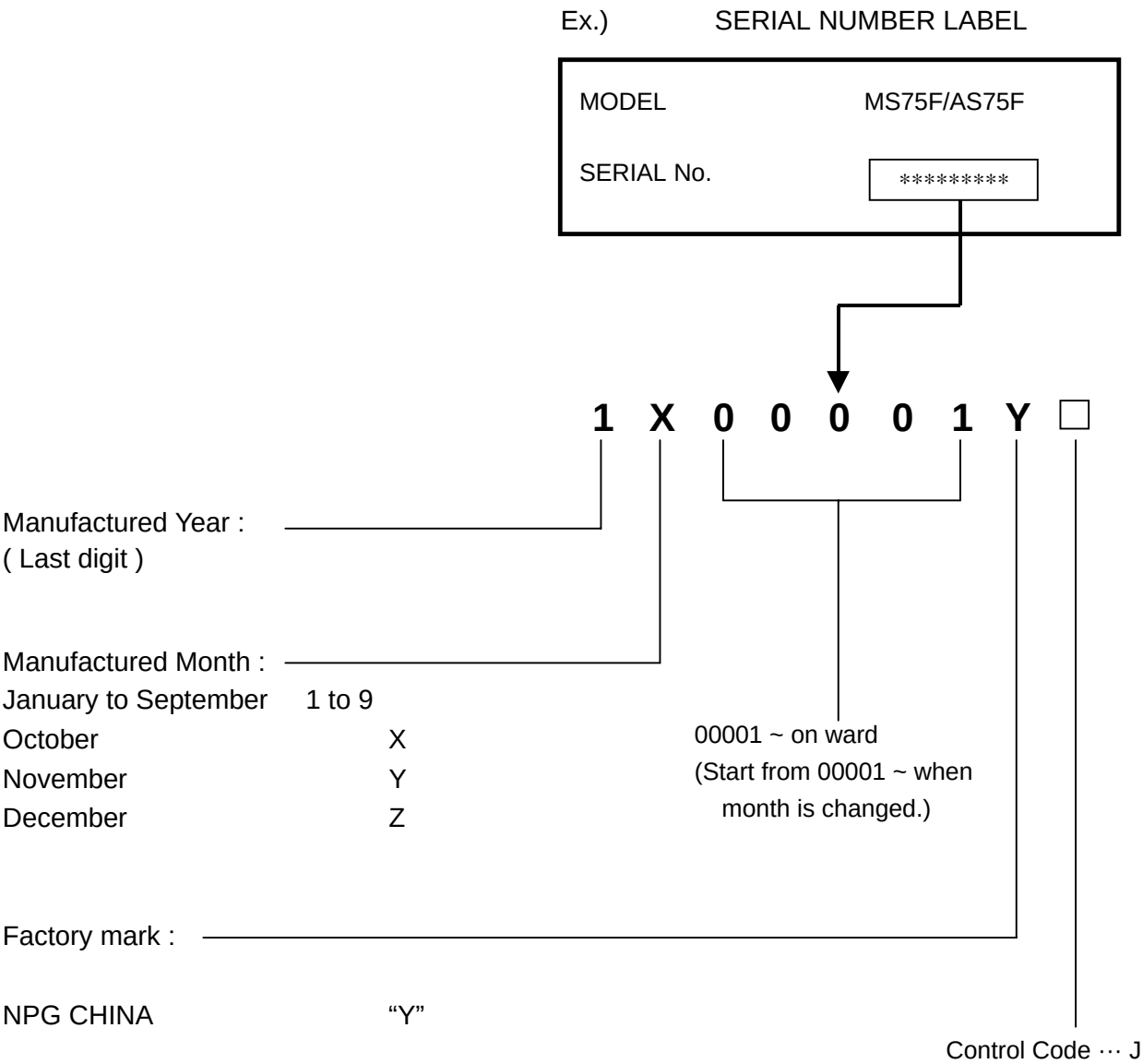
Horizontal Moire Canceler: Reduces horizontal moire levels.



Vertical Moire Canceler: Reduces vertical moire levels.

SERIAL NUMBER INFORMATION

Refer to the serial number information shown below.



DISASSEMBLY

Cabinet Back

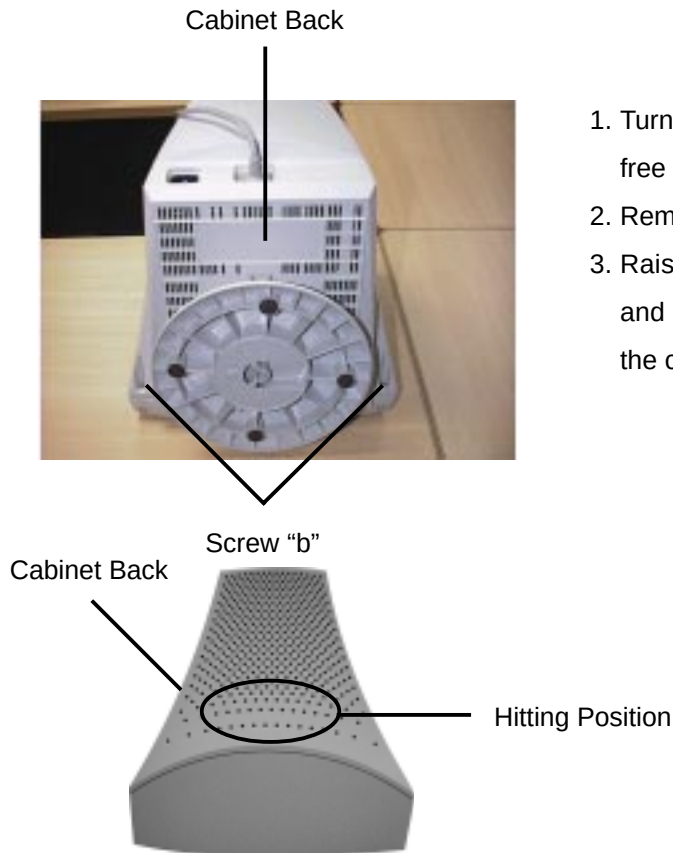
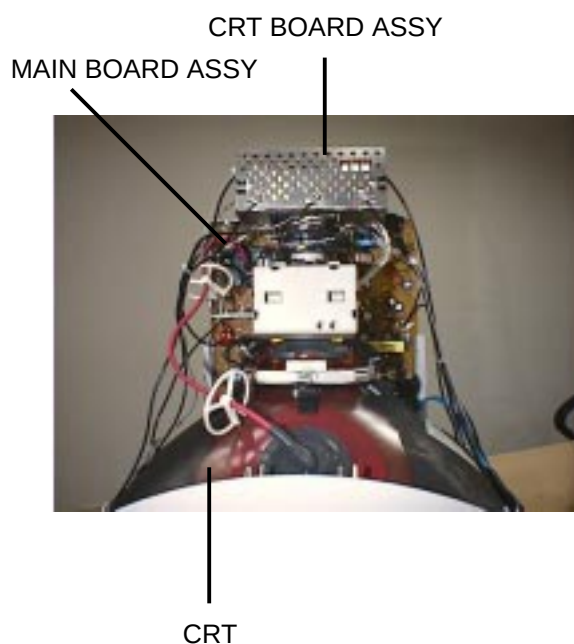


Fig. 1

1. Turn the monitor CRT face down on a clean static free surface to prevent scratching CRT face.
2. Remove the screw "b".
3. Raise the signal cable vicinity of a cabinet back and lightly hit part (figure 1 reference) of a top of the cabinet back and remove the cabinet back.

MAIN BOARD and CRT BOARD



1. Unsolder the GND wire from MAIN BOARD ASSY
2. Disconnect the connector "P201", "P202", "S204" and "S205" from the CRT BOARD ASSY
3. Disconnect the CRT BOARD ASSY from the CRT
4. Disconnect the connector "S301" and "P102" from the MAIN BOARD ASSY.
5. Remove the Anode Cap from the CRT.

NOTE:

Carefully discharge the CRT anode by shorting it to ground before removing Anode Cap.

6. Lift up the MAIN BOARD ASSY from the Cabinet Front ASSY.

ADJUSTMENT SPECIFICATIONS

TABLE OF CONTENTS

	Page
(1) Adjustment & Inspection Tools	14
(2) Timing Table	14
(3) Definition for Normal Condition	14
(4) Hot Key Operation	14
(5) B+ Adjustment	15
(6) X-ray Test	15
(7) H.V. B+ Adjustment	15
(8) H-Raster Center Adjustment	15
(9) Pre-Adjustment	15
(10) White Balance Adjustment	15
(A) Setting	15
(B) Cut Off Adjustment	16
(C) White Balance Adjustment (Factory Auto Adjustment)	16
(D) "sRGB MODE" White Balance Adjustment	16
(11) Convergence Adjust	16
(12) Power Saving Function Inspection	16
(13) Geometry Adjustment.....	17
(14) DDC 1/2B Writing and Inspection	17
(15) Setting Before Shipment	18
(16) Adjustment Magnetic Field	18
(17) Timing Sheet	19
Reference	
Distortion Adjustment	23
Inspection of PnP communication and Writing EDID to EEPROM and inspection of PnP communication	26

(1) Adjustment & Inspection Tools:

- | | |
|-----------------------------------|-----------------------------------|
| (A) Color Analyzer | (B) Signal Generator CHAROMA 2135 |
| (C) Multi Meter | (D) Hi-Voltage Probe |
| (E) Convergence Meter | (F) Demagnetizer Probe |
| (G) Power Meter | (H) Automatic Alignment System |
| (I) DDC write & inspection system | |

(2) TIMING TABLE(Factory Mode -20 MODES)

MODE	RESOLUTION	H-SYNC EREQ.	V-SYNC FREQ	H . POLARITY	V . POLARITY
1	VGA350	31.5KHz	70Hz	+	-
2	VGA400	31.5kHz	70Hz	-	+
3	VGA480	31.5KHz	60Hz	-	-
4	MAC 35K	35.0KHz	66Hz	-	-
5	800*600(56)	35.2KHz	56Hz	+	+
6	8514A	35.5KHz	87Hz	+	+
7	640*480(75)	37.5KHz	75Hz	-	-
8	EVGA400	37.8KHz	84Hz	-	+
9	800*600(60)	37.8KHz	60Hz	+	+
10	640*480	43.3KHz	85Hz	-	-
11	800*600(75)	46.8KHz	75Hz	+	+
12	1024*768(60)	48.3KHz	60Hz	-	-
13	MAC 49K	49.7KHz	74Hz	-	-
14	800*600(85)	53.6KHz	85Hz	+	+
15	1024*768(70)	56.4KHz	70Hz	-	-
16	1024*768(75)	60.0KHz	75Hz	+	+
17	640*480(120)	63.7KHz	120Hz	-	-
18	1280*1024(60)	64.0KHz	60Hz	+	+
19	800*600(100)	64.0KHz	100Hz	+	+
20	1024*768(85)	68.6KHz	85Hz	+	+

(3) Definition for Normal Condition

- (A) Input AC Voltage 110V/60HZ.
 (B) Warm up time minimum 30 minutes.
 (C) Full White Pattern. See (4)-(C) Aging Mode.
 (D) ALL VR's Adjust Center Position.
 (E) Color temperature setting: 9300K
 (F) OSD I-CON [R], [G], [B] gain control bar center position in Factory Mode

(4) Hot Key Operation

- (A) Factory Mode: SELECT Key + UP (+) Key if pressed when the power SW on.
 (OSD Position Control Mode is in Factory Mode Menu)
 (B) Auto Alignment mode and DDC 2B Writing/Inspection Mode: Down (-) Key if pressed when the power SW on.

(C) Auto Function Test Mode : UP (+) Key if pressed when the power SW on.

Mode 1: Out put the maximum and minimum value of DAC for each control if the video signal comes in.

Mode 2: Out put the Cross Hatch Pattern for 1 minutes if the Signal Cable is not connected

(5) B+ Adjustment

(A) MODE: No. 12.

(B) Pattern: Full white. (Brightness just cut off)

(C) Adjust VR101 to make the cathode of D112 has 13.6V.

(D) Check other power source should be $82 \pm 2V$, $6.2V \pm 0.3V$, $49V \pm 1.5V$, $-11.5V \pm 0.5V$.

(6) X-RAY Test

(A) Mode: No.12

(B) Pattern: Normal Crosshatch (Brightness just cut off)

(C) Test

Apply a resistor(39K, 1/4W, 1%) between TP1 and TP2 then power on, Monitor should be active in X-Ray protector.

(7) H. V. Confirmation

(A) Mode: No. 12

(B) Pattern: Full Black (Brightness just cut off)

(C) Check the high voltage is $25.5 \pm 0.5kV$.

(8) H-Raster Center Adjustment

(A) Mode: No. 18

(B) Pattern: Crosshatch Reverse

(C) Adjust the Brightness Control that the background can be visible.

(D) Change VR301 to make the back ground should be center off the CRT.

(9) Pre-Adjustment

(A) Mode: No. 12

(B) Pattern: Crosshatch

(C) Enter to Factory mode. Adjust H-phase, V-center, H-size, V-size, Pincushion, Trapezoid, Bow, Parallelogram and rotation to make Picture Position Center and Picture Size 310*232mm.

(10) White Balance Adjustment

(A) Setting

Enter Factory Mode,

Mode: No. 12, Pattern: Full White.

Warm up 30 min.

Make External Degauss.

For SRGB adjust, please change mode to No.20.

(B) Cut Off Adjustment

1. Select the color Mode 9300K
2. Cut Off Adjustment: Video Signal Off (0.vp-p), Bright Control set to Max., Adjust the G2, at the Brightness 1~1.5FL. (3.4~5.1 cd/m²)
3. Adjust VR210, VR230 and VR250 to make X=283, Y=297, with readjusting G2 to keep the brightness between 1~1.5FL (3.4~5.1 cd/m²).

(C) White Balance Adjustment (Factory Auto Adjustment)

1.9300K (Select the color Mode 9300K)

- 1) 50*50mm Green block Pattern, Brightness Control set to Max, Contrast Control set to Max, Adjust [G] gain control to Y=45FL. (154 cd/m²)
- 2) Change Pattern to Full White, Brightness control set to Min.
- 3) Adjust [R] gain control, [B] gain control to X=283, Y=297 at the contrast control is adjusted 15FL (52cd/m²).
- 4) Check the color tracking shall be $X=283\pm15$, $Y=297\pm15$ between Y=5~25FT-L (17~86cd/m²) condition.

2.7500K (Select the color Mode 7500K)

- 1) 50*50mm Green block Pattern, Brightness Control set to Max, Contrast Control set to Max, Adjust [G] gain control to Y=42FL. (144 cd/m²)
- 2) Change Pattern to Full White, Brightness control set to Min.
- 3) Adjust [R] gain control, [B] gain control to X=300, Y=315 at the contrast control is adjusted 15FL (52cd/m²).

3. Maximum Brightness Adjustment for 9300K and 7500K mode

- 1) Select 9300K mode.
- 2) Brightness control set to Max., Contrast control set to Max.
- 3) Adjust "AB" in Factory mode to Y=31FL (105cd/m²).

(D) "sRGB MODE" White Balance Adjustment (Select the color Mode sRGB)

1. Set "AB"(sRGB) to 150 counts of control bar. (Total 255)
2. Video Signal off (0 Vp-p), Contrast set to Max., Adjust Brightness to 0.1 cd/m².
3. Change Pattern to 50*50 mm Green block, Adjust [G] gain control to Y=75 cd/m² (22FL).
4. Change Pattern to 50*50 mm White block, Adjust [R] gain and [B] gain to X=313, Y=329.
5. Adjust contrast control to Y=88 cd/m² (25.7FL).

(11) Convergence Adjust

(A) Mode: No. 12

(B) Pattern: Crosshatch.

(C) Use the convergence meter to check whether the convergence is within spec.
Adjust the CPC Magnet to make the convergence within spec.

(12) Power Saving Function Inspection

(A) Mode: No. 12

(B) Pattern: Any Pattern

(C) Inspection

1. It should be into power off Mode when the both horizontal sync and vertical sync are disable after 4 sec. Check the LED color "Orange" and the power consumption must be less than 5W.
2. The picture should be recovered readable within 3 seconds when the both horizontal sync and vertical sync are enable. Check the LED color "Green".

(13) Geometry Adjustment (Factory Auto Alignment)

(A) Power on with press (-) key.

(B) Adjust H-size, V-size, H-phase, V-phase, Pincushion, and Trapezoid for all preset signals.

(C) Adjustment data are automatically stored into the factory-preset memory after 1 sec.

Note: For the factory auto alignment, Mode No. 2, 3, 7, 9, 10, 11, 12, 14, 15, 16, 17, 19, 20 shall be adjusted. Other modes can be used the calculated average value.

(14) DDC 1/2B Writing and Inspection

(A) Power on with press (-) key. Any Mode, Any Pattern.

(B) Connect the MICON Tech. DDC Read/Write System.

(C) Scan bar code label and apply serial NO. to EDID Data.

EDID data Table

AS75F

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	38	A3	CF	5D	01	01	01	01
10	0A	0A	01	03	0C	21	18	78	EA	57	98	A4	52	46	97	24
20	11	48	4C	FF	EE	00	31	59	45	59	61	59	71	4A	81	40
30	01	01	01	01	01	01	EA	24	00	60	41	00	28	30	30	60
40	13	00	36	E8	10	00	00	1E	00	00	00	FD	00	37	78	1F
50	46	0B	00	0A	20	20	20	20	20	20	00	00	00	FC	00	41
60	63	63	75	53	79	6E	63	20	37	35	46	0A	00	00	00	FF
70	00	30	33	30	30	30	30	31	59	41	0A	20	20	20	00	3C

MS75F

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	38	A3	D1	5D	01	01	01	01
10	0A	0A	01	03	0C	21	18	78	EA	57	98	A4	52	46	97	24
20	11	48	4C	FF	EE	00	31	59	45	59	61	59	71	4A	81	40
30	01	01	01	01	01	01	EA	24	00	60	41	00	28	30	30	60
40	13	00	36	E8	10	00	00	1E	00	00	00	FD	00	37	78	1F
50	46	0B	00	0A	20	20	20	20	20	20	00	00	00	FC	00	4D
60	75	6C	74	69	53	79	6E	63	20	37	35	46	00	00	00	FF
70	00	30	33	30	30	30	30	31	59	41	0A	20	20	20	00	B5

Note: Week code, Year code, Serial No. depend on the Serial No. Label.

(15) Setting Before Shipment

Color Temp 9300K

OSD Back Ground: Blue

OSD Position: Center of the screen

Contrast: Maximum

Brightness: Preset

H. V moire cancel function: Minimum

Self test pattern: Cross Hatch Pattern for 1 minutes, if the Signal Cable is not connected.

(Select the "P2" in the "Factory Mode")

(16) Adjustment Magnetic Field

Vertical: +40uT, Horizontal: +/-0uT(Neutral).

(17) TIMING SHEET

Rev1.0

Preset Mode No.	1	2	3	4	5	6
Signal Name	VGA350	VGA400	VGA480	MACII (35K)	800*600 (56)	8514/A XGA
Resolution	640*350	640*400	640*480	640*480	800*600	1024*768
Dot Clock (MHz)	25.175	25.175	25.175	30.240	36.000	44.900
fh (kHz)	31.47	31.47	31.47	35.00	35.16	35.52
fv (Hz)	70.09	70.09	59.94	66.67	56.25	86.96
Total (dot)	800	800	800	864	1024	1264
(uS)	31.78	31.78	31.78	28.57	28.44	28.15
Disp (dot)	640	640	640	640	800	1024
(uS)	25.42	25.42	25.42	21.16	22.22	22.81
Front (dot)	16	16	16	64	24	8
(uS)	0.64	0.64	0.64	2.12	0.67	0.18
Sync Pulse (dot)	96	96	96	64	72	176
(uS)	3.18	3.81	3.81	2.12	2.00	3.92
Back (dot)	48	48	48	96	128	56
(uS)	1.91	1.91	1.91	3.17	3.56	1.25
Total (H)	449	449	525	525	625	408.5
(mS)	14.268	14.268	16.683	15.000	17.778	11.500
Disp (H)	350	400	480	480	600	384
(mS)	11.122	12.711	15.253	13.714	17.067	10.810
Front (H)	37	12	10	3	1	0
(mS)	1.176	0.381	0.318	0.086	0.028	0.000
Sync Pulse (H)	2	2	2	3	2	4
(mS)	0.064	0.064	0.064	0.086	0.057	0.113
Back (H)	60	35	33	39	22	20
(mS)	1.907	1.112	1.049	1.114	0.626	0.563
Interlace	NON	NON	NON	NON	NON	YES
Polarity (H/V)	POS/NEG	NEG/POS	NEG/NEG	NEG/NEG	POS/POS	POS/POS
Composite Sync				NEG		
Composite Video						
Character Font	7*9	7*9	7*9	7*9	7*9	7*9
Serration	OFF	OFF	OFF	ON	OFF	OFF
EQP	OFF	OFF	OFF	OFF	OFF	OFF

Preset Mode No.	7	8	9	10	11	12
Signal Name	640*480 (75)	EVGA400 (VESA)	800*600 (60)	640*480 (85)	800*600 (75)	10*7(60) (VESA)
Resolution	640*480	640*400	800*600	640*480	800*600	1024*768
Dot Clock (MHz)	31.500	31.5000	40.000	36.000	49.500	65.000
fh (kHz)	37.50	37.86	37.88	43.27	46.88	48.36
fv (Hz)	75.00	84.13	60.32	85.01	75.00	60.00
Total (dot)	840	832	1056	832	1056	1344
(uS)	26.67	26.41	26.40	23.11	21.33	20.68
Disp (dot)	640	640	800	640	800	1024
(uS)	20.32	20.32	20.00	17.78	16.16	15.75
Front (dot)	16	24	40	56	16	24
(uS)	0.51	0.76	1.00	1.56	0.32	0.37
Sync Pulse (dot)	64	40	128	56	80	136
(uS)	2.03	1.27	3.20	1.56	1.62	2.09
Back (dot)	120	128	88	80	160	160
(uS)	3.81	4.06	2.20	2.22	3.23	2.46
Total (H)	500	450	628	509	625	806
(mS)	13.333	11.886	16.579	11.76	13.333	16.666
Disp (H)	480	400	600	480	600	768
(mS)	12.800	10.565	15.840	11.093	12.800	15.880
Front (H)	1	9	1	1	1	3
(mS)	0.027	0.238	0.026	0.023	0.021	0.062
Sync Pulse (H)	3	3	4	3	3	6
(mS)	0.080	0.079	0.106	0.069	0.064	0.124
Back (H)	16	38	23	25	21	29
(mS)	0.427	1.004	0.607	0.578	0.448	0.600
Interlace	NON	NON	NON	NON	NON	NON
Polarity (H/V)	NEG/NEG	NEG/POS	POS/POS	NEG/NEG	POS/POS	NEG/NEG
Composite Sync						
Composite Video						
Character Font	7*9	7*9	7*9	7*9	7*9	7*9
Serration	OFF	OFF	OFF	OFF	OFF	OFF
EQP	OFF	OFF	OFF	OFF	OFF	OFF

Preset Mode No.	13	14	15	16	17	18
Signal Name	MACII (49.7K)	800*600 (85)	10*7(70) (VESA)	10*7(75) (VESA)	640*480 (120)	12*10(60) (VESA)
Resolution	832*624	800*600	1024*768	1024*768	640*480	1280*1024
Dot Clock (MHz)	57.286	56.250	75.000	78.750	55.00	108.000
fh (kHz)	49.73	53.67	56.48	60.02	63.66	63.98
fv (Hz)	74.55	85.06	70.07	75.03	120.11	60.02
Total (dot)	1152	1048	1328	1312	864	1688
(uS)	20.11	18.63	17.71	16.66	15.71	15.63
Disp (dot)	832	800	1024	1024	640	1280
(uS)	14.52	14.22	13.65	13.00	11.645	11.85
Front (dot)	32	32	24	16	32	48
(uS)	0.56	0.57	0.32	0.20	0.582	0.44
Sync Pulse (dot)	64	64	136	96	96	112
(uS)	1.12	1.14	1.81	1.22	1.745	1.04
Back (dot)	224	152	144	176	96	248
(uS)	3.91	2.70	1.92	2.23	1.745	2.30
Total (H)	667	631	806	800	530	1066
(mS)	13.413	11.756	14.272	13.328	8.325	16.661
Disp (H)	624	600	768	768	480	1024
(mS)	12.548	11.179	13.599	12.795	7.540	16.005
Front (H)	1	1	3	1	8	1
(mS)	0.020	0.019	0.053	0.017	0.126	0.016
Sync Pulse (H)	3	3	6	3	6	3
(mS)	0.060	0.056	0.106	0.050	0.094	0.047
Back (H)	39	27	29	28	36	38
(mS)	0.784	0.503	0.513	0.466	0.566	0.594
Interlace	NON	NON	NON	NON	NON	NON
Polarity (H/V)	NEG/NEG	POS/POS	NEG/NEG	POS/POS	NEG/NEG	POS/POS
Composite Sync	NEG					
Composite Video						
Character Font	7*9	7*9	7*9	7*9	7*9	7*9
Serration	ON	OFF	OFF	OFF	OFF	OFF
EQP	OFF	OFF	OFF	OFF	OFF	OFF

Preset Mode No.	19	20				
Signal Name	800*600 (100)	1024*768 (85)				
Resolution	800*600	1024*768				
Dot Clock (MHz)	67.50	94.5				
fh (kHz)	63.92	68.677				
fv (Hz)	100.03	85				
Total (dot)	1056	1376				
(uS)	15.64	14.561				
Disp (dot)	800	1024				
(uS)	11.852	10.836				
Front (dot)	40	48				
(uS)	0.593	0.508				
Sync Pulse (dot)	80	96				
(uS)	1.185	1.016				
Back (dot)	136	208				
(uS)	2.015	2.201				
Total (H)	639	808				
(mS)	9.997	11.765				
Disp (H)	600	768				
(mS)	9.386	11.183				
Front (H)	3	1				
(mS)	0.047	0.015				
Sync Pulse (H)	4	3				
(mS)	0.063	0.044				
Back (H)	32	36				
(mS)	0.501	0.524				
Interlace	NON	NON				
Polarity (H/V)	POS/POS	POS/POS				
Composite Sync						
Composite Video						
Character Font	7*9	7*9				
Serration	OFF	OFF				
EQP	OFF	OFF				

Distortion Adjustment

Factory Mode Setting

*After completion of adjustment exit the factory mode and data will be saved.

Signal : All signals Cross hatch

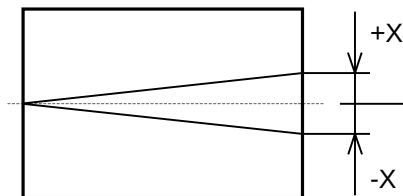
Perform the adjust for signal No. 14 in step 6-1~3.

Perform the adjust for above all signal in step 6-4,5.

1. Picture Tilt Adjustment

- (1) Receive signal 14 (Cross hatch).
- (2) When OSM MENU is displayed, Select the “” icon.
- (3) Make sure that the picture tilt meets the following standards.

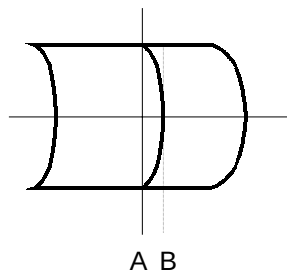
$$X \leq \pm 1.0 \text{ mm}$$



2. Pincushion Balance Adjustment

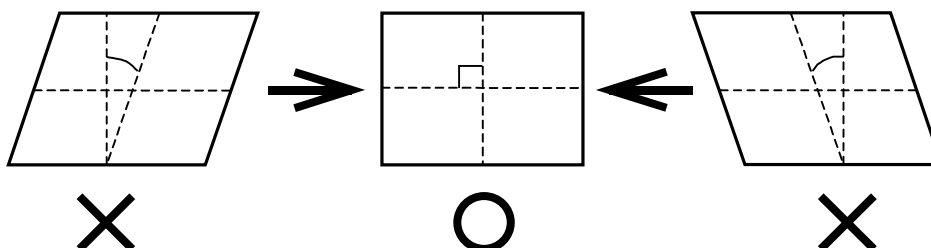
- (1) When OSM MENU is displayed, Select the “” icon.
- (2) Make sure that the Pincushion Balance meets the following standards.

$$A - B \leq 0.5 \text{ mm}$$



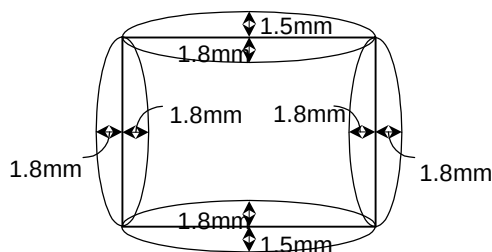
3. Parallelogram distortion Adjustment

- (1) When OSM MENU is displayed, Select the “” icon.
- (2) Adjust “+”, “-“ SW so that the vertical line and horizontal line at the screen's center fall at right angles. (less than 90 ± 0.5 degree)



4. Side Pincushion Adjustment

- (1) When OSM MENU is displayed, Select the “” icon.
- (2) Make sure that the side pincushion distortion meets the following standards.

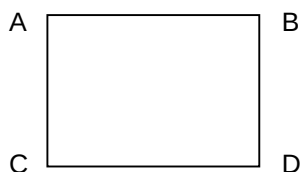


5. Trapezoid Distortion Adjustment

- (1) When OSM MENU is displayed, Select the “” icon.
- (2) Make sure that the trapezoid distortion meets the following standards.

$$| (AB-CD) | \leq 2\text{mm}$$

$$| (AC-BD) | \leq 2\text{mm}$$



6. Preset Picture Size and Position Adjustment

Factory Mode Setting

Signal: All Signals Cross hatch

*Perform the Preset Picture Size and Position Adjustment for above all signal.

- (1) When OSM MENU is displayed, Select the “”, “”, “”, “” icon.
- (2) Adjust the picture size and position as listed below by “-”, “+” SW.

Picture size

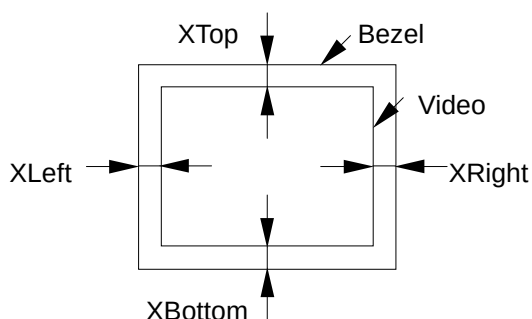
H : $310 \pm 2\text{mm}$

V : $232 \pm 2\text{mm}$

Picture position

H : $| (X_{\text{TOP}} - X_{\text{BOTTOM}}) | \leq 3\text{mm}$

V : $| (X_{\text{LEFT}} - X_{\text{RIGHT}}) | \leq 3\text{mm}$



7. Purity

- (1) Receive signal 14(Cross hatch pattern).
- (2) The CRT face should be facing east and degauss the entire unit by external degaussing coil.
- (3) Make sure the single color purity.

If not, readjust CPC magnet and touch up using correction magnets.

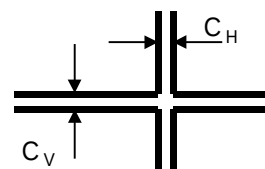
8. Convergence

C_H : Convergence error of horizontal direction

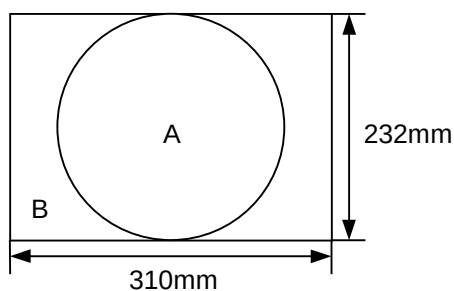
C_V : Convergence error of vertical direction

C_S : Total direction of Convergence error

(Calculate by " $\sqrt{C_H^2 + C_V^2}$ ")



- (1) Receive signal 14(Cross hatch pattern).
- (2) Measure convergence error., If it is out of spec, adjust static convergence by 4-pole magnets and 6-pole magnets.



A Zone (A circle 232 mm in the center of the CRT face center)

C_H, C_V : Within 0.35 mm

C_S : No rule

B Zone (Areas outside of zone A within the rectangle of 310 mm×232 mm)

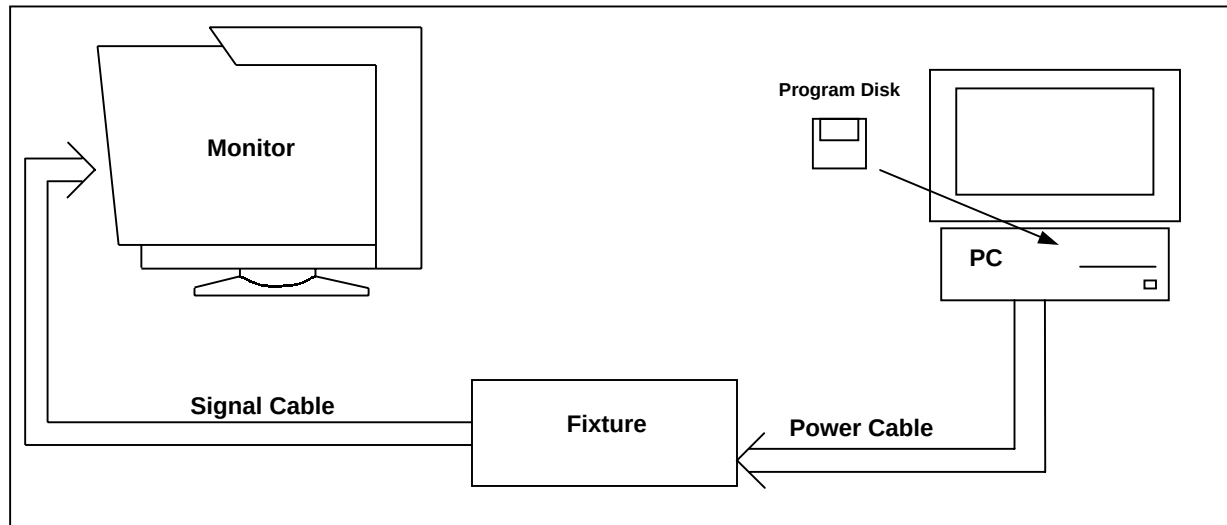
Safety with the list below.

	$C_H \leq 0.35 \text{ mm}$	$0.35 \text{ mm} < C_H < 0.40 \text{ mm}$
$C_V \leq 0.35 \text{ mm}$	OK	Calculate C_S and judge Within 0.50 mm → OK
$0.35 \text{ mm} < C_V < 0.40 \text{ mm}$	Calculate C_S and judge Within 0.50 mm → OK	Need to touch up

Write and Inspection for Plug and Play Communication

1. Construction of System

This system should be connected as shown below.



Note: PC clock speed should be below 266MHz. OS is PC-DOS.

Fixture Board can be connected directly to PC without Printer Cable.

2. EDID Write and Inspection Method

1) Run specified EDID write and Inspection program on PC-DOS mode.

The monitor turns into the self test mode.

2) Run the specified EDID write and inspection program under PC-DOS mode.

3) Key in the serial No. or Scan serial No. bar code.

4) Press "Return" key to write the EDID data.

5) Press "F1" key to inspect DDC1 communication.

6) Press "F2" key to inspect DDC2 communication

EDID DATA Format: Please refer the 3. EDID data File.

3. EDID DATA FILE

(1) EDID Serial No. Format

MultiSync 75F

Week of Manufacture (Month*4)

Year of Manufacture

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	38	A3	D1	5D	01	01	01	01
10	0A	0A	01	03	0C	21	18	78	EA	57	98	A4	52	46	97	24
20	11	48	4C	FF	EE	00	31	59	45	59	61	59	71	4A	81	40
30	01	01	01	01	01	01	EA	24	00	60	41	00	28	30	30	60
40	13	00	36	E8	10	00	00	1E	00	00	00	FD	00	37	78	1F
50	46	0B	00	0A	20	20	20	20	20	20	00	00	00	FC	00	4D
60	75	6C	74	69	53	79	6E	63	20	37	35	46	00	00	00	FF
70	00	30	33	30	30	30	30	31	59	41	0A	20	20	20	00	B5

Serial No Area 9bytes

Check Sum

AccuSync 75F

Week of Manufacture (Month*4)

Year of Manufacture

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	38	A3	D1	5D	01	01	01	01
10	0A	0A	01	03	0C	21	18	78	EA	57	98	A4	52	46	97	24
20	11	48	4C	FF	EE	00	31	59	45	59	61	59	71	4A	81	40
30	01	01	01	01	01	01	EA	24	00	60	41	00	28	30	30	60
40	13	00	36	E8	10	00	00	1E	00	00	00	FD	00	37	78	1F
50	46	0B	00	0A	20	20	20	20	20	20	00	00	00	FC	00	4D
60	75	6C	74	69	53	79	6E	63	20	37	35	46	00	00	00	FF
70	00	30	33	30	30	30	30	31	59	41	0A	20	20	20	00	B5

Serial No Area 9bytes

Check Sum

(2) Bar Code Format(code39)

MS75F

Digit		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Format	*	N	N	N	N	N	N	N	N	N			Y	M	S	S	S	S	S	F	R	*
Example	*	N	B	7	0	2	1	5	L				1	X	0	0	0	0	1	Y	J	*

*+Model Code + 3 spaces + Serial No. + *

AS75F

Digit		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Format	*	N	N	N	N	N	N	N	N	N			Y	M	S	S	S	S	S	F	R	*
Example	*	N	A	7	0	2	1	6	L				1	X	0	0	0	0	1	Y	J	*

*+Model Code + 3 spaces + Serial No. + *

Serial No. Descriptions:

Y: Manufactured Year (Last digit) ex. 1 → 2001

M: Manufactured Month 1 ~ 9, X(October),
Y(November), Z(December)

S: Serial No. (5digits) 00001 ~ onward
(restart when month is changed)

F: Factory Code: Y is NPG China Factory

R: Product Revision code: start from J

EDID Code Input Procedure ex.

- 1) Scan Bar code (20 digits) NB70215L_ 1X00001YJ
- 2) Skip 11 digits then find the Serial No. 1X00001YJ
- 3) Make Year hex Code from Year digit 1 → 0Bh
- 4) Make Week hex Code from Month digit $10 \times 4 = 40 \rightarrow 28h$
- 5) Change Serial No. to ASCII code 31h 58h 30h 30h 30h 30h 31h 59h 4Ah
- 6) Apply Serial No. Information to the default EDID code.
- 7) Download EDID from PC to Monitor.
- 8) DDC2B Inspection

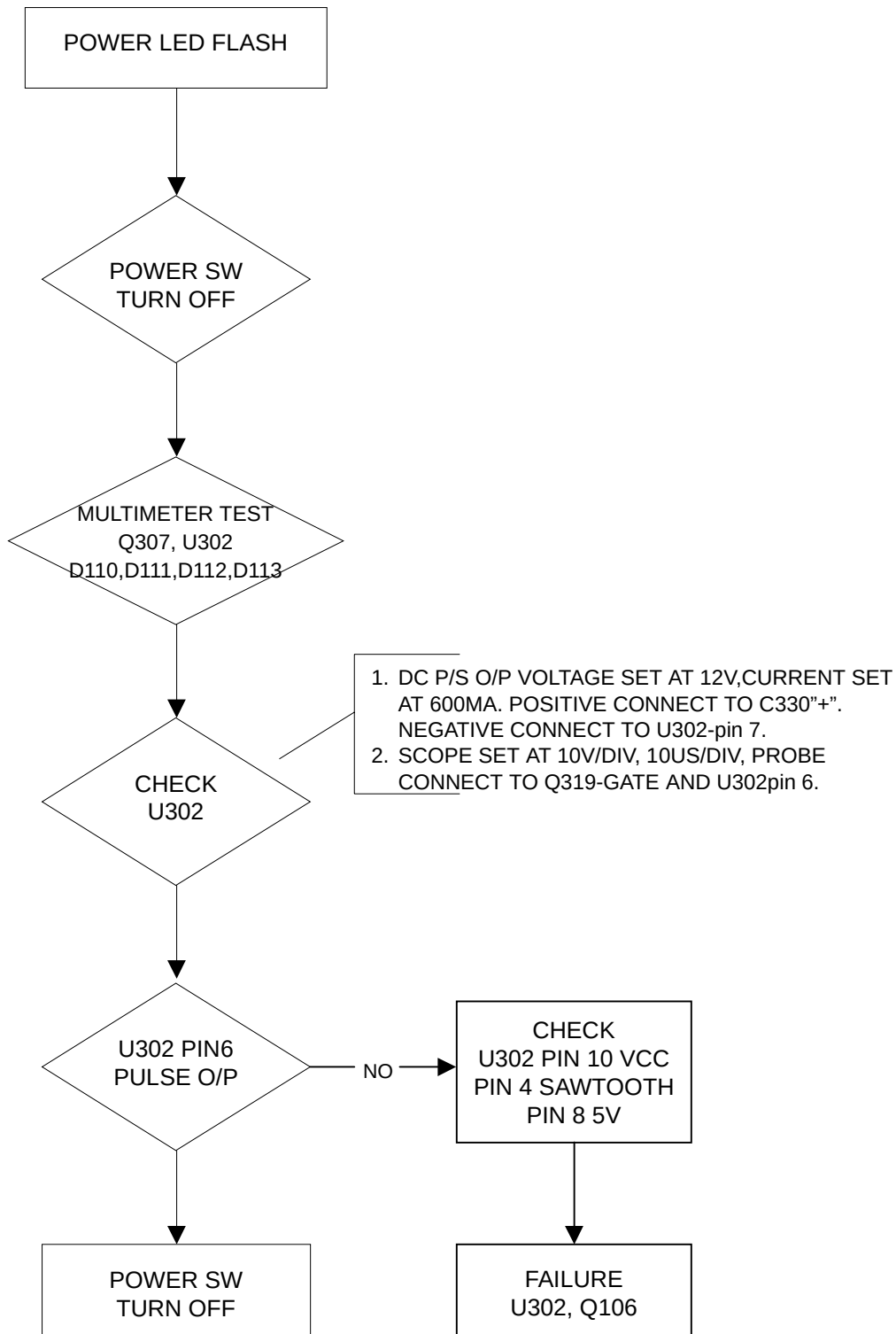
TROUBLE SHOOTING

Refer to User's Manual trouble shooting section before using this chart.

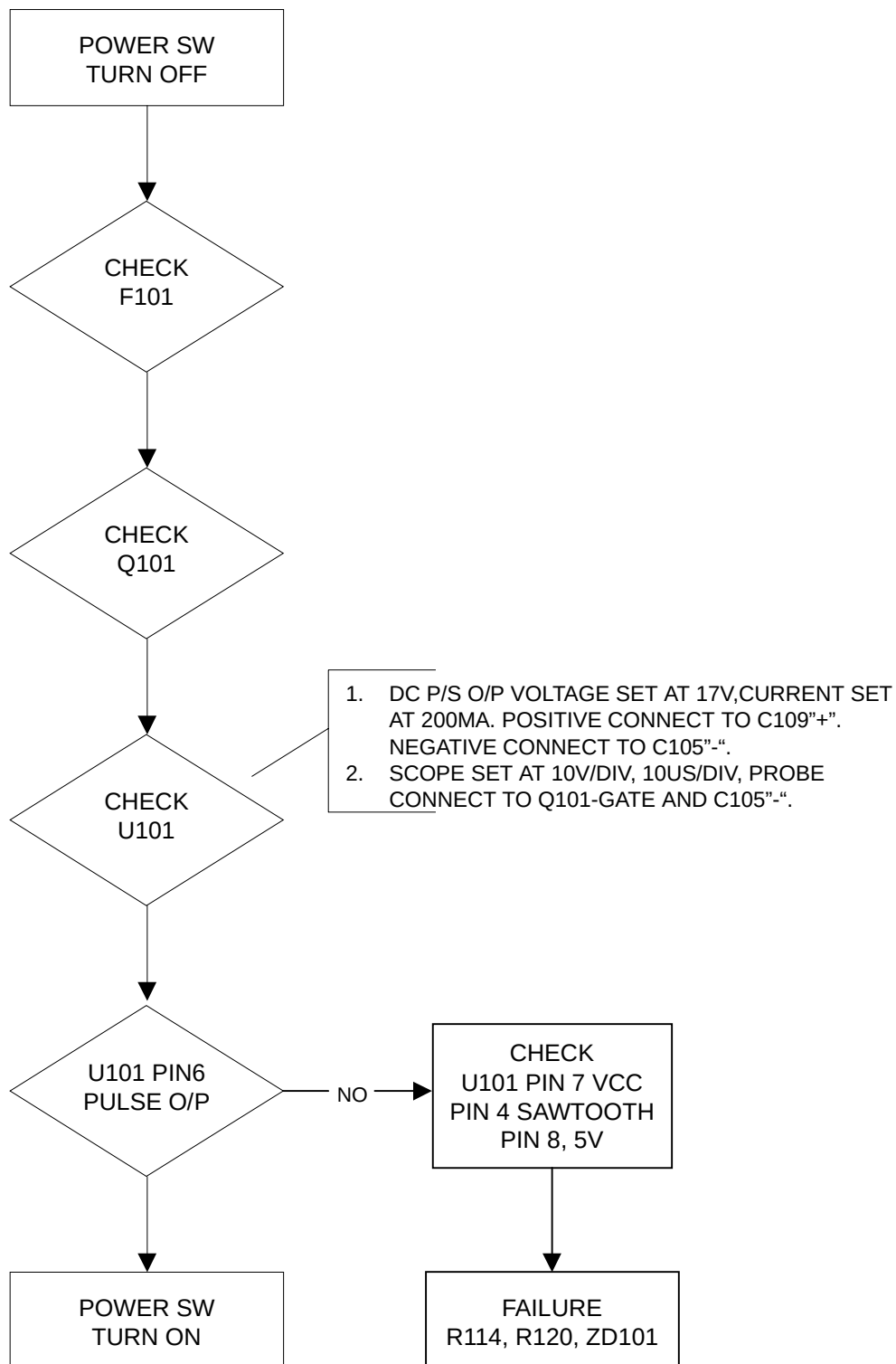
TABLE OF CONTENTS

	Page
1. NO OPERATION, POWER LED FLASH	30
2. NO OPERATION, POWER LED OFF	31
3. VIDEO NOISE, OUT OF SYNC	32
4. NO VIDEO	33
5. NO RASTER	34
6. TROUBLE IN H.V SYNC	35
7. PINCUSHION POOR	36

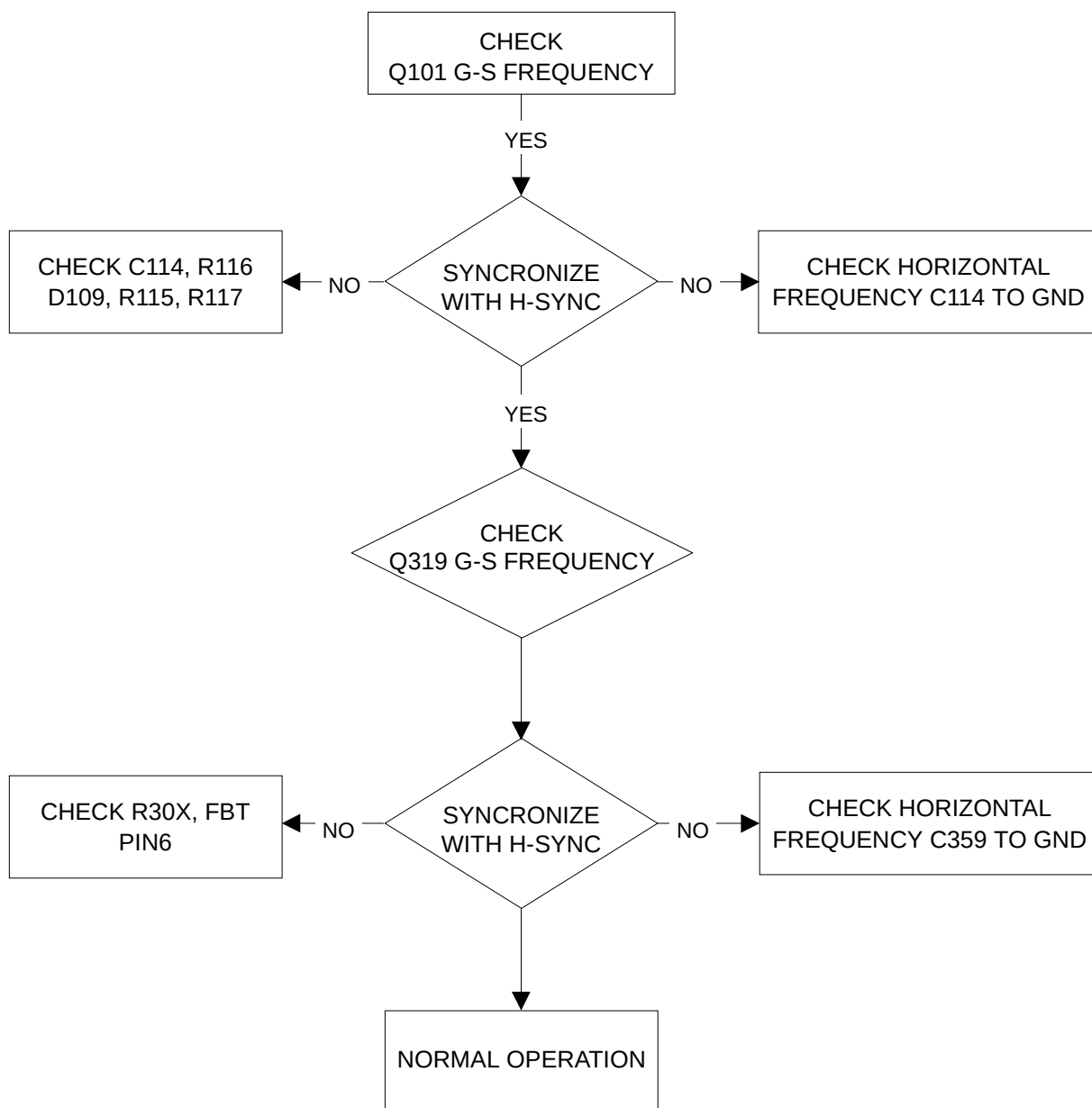
1. NO OPERATION, POWER LED FLASH



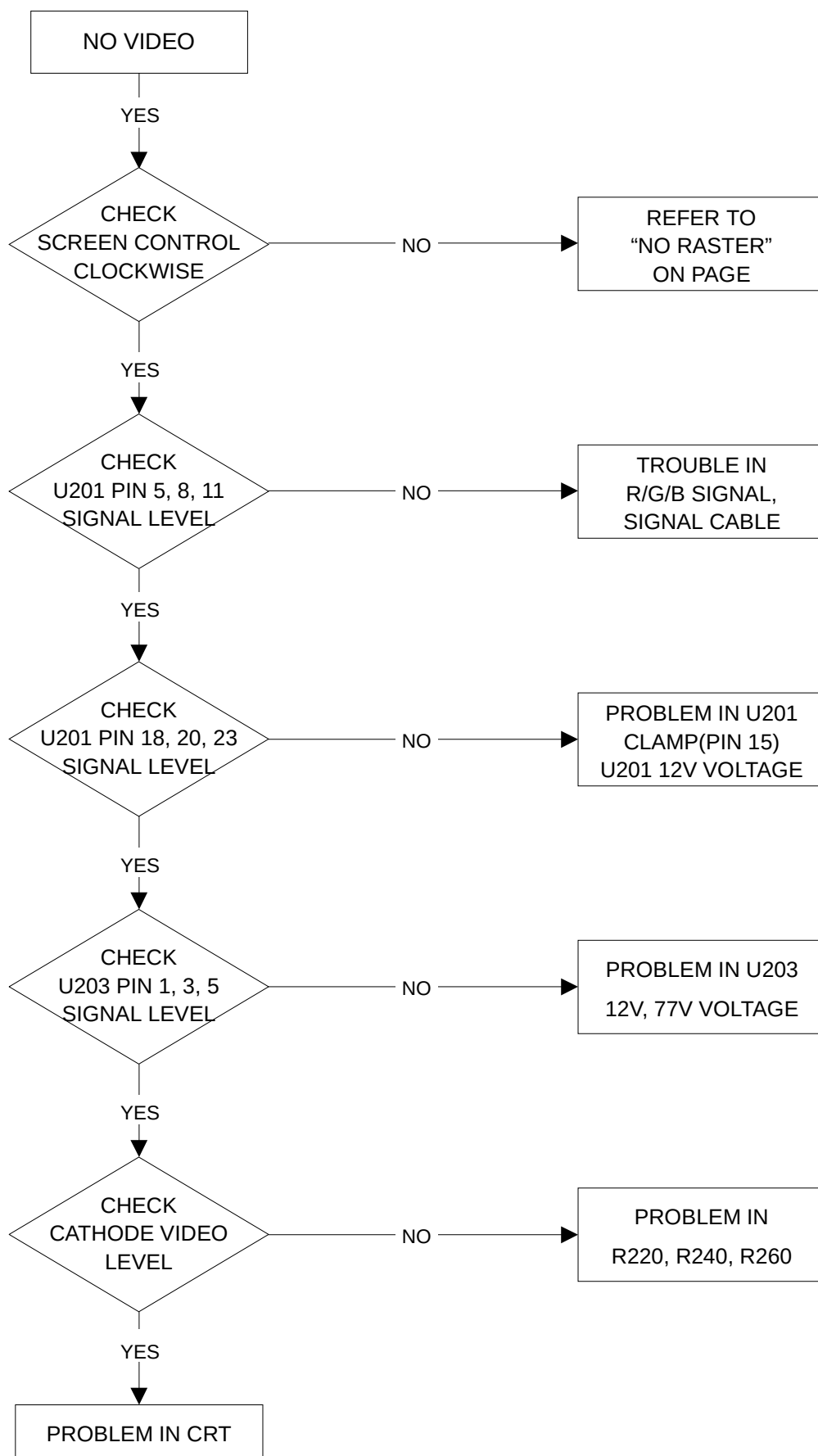
2. NO OPERATION, POWER LED OFF



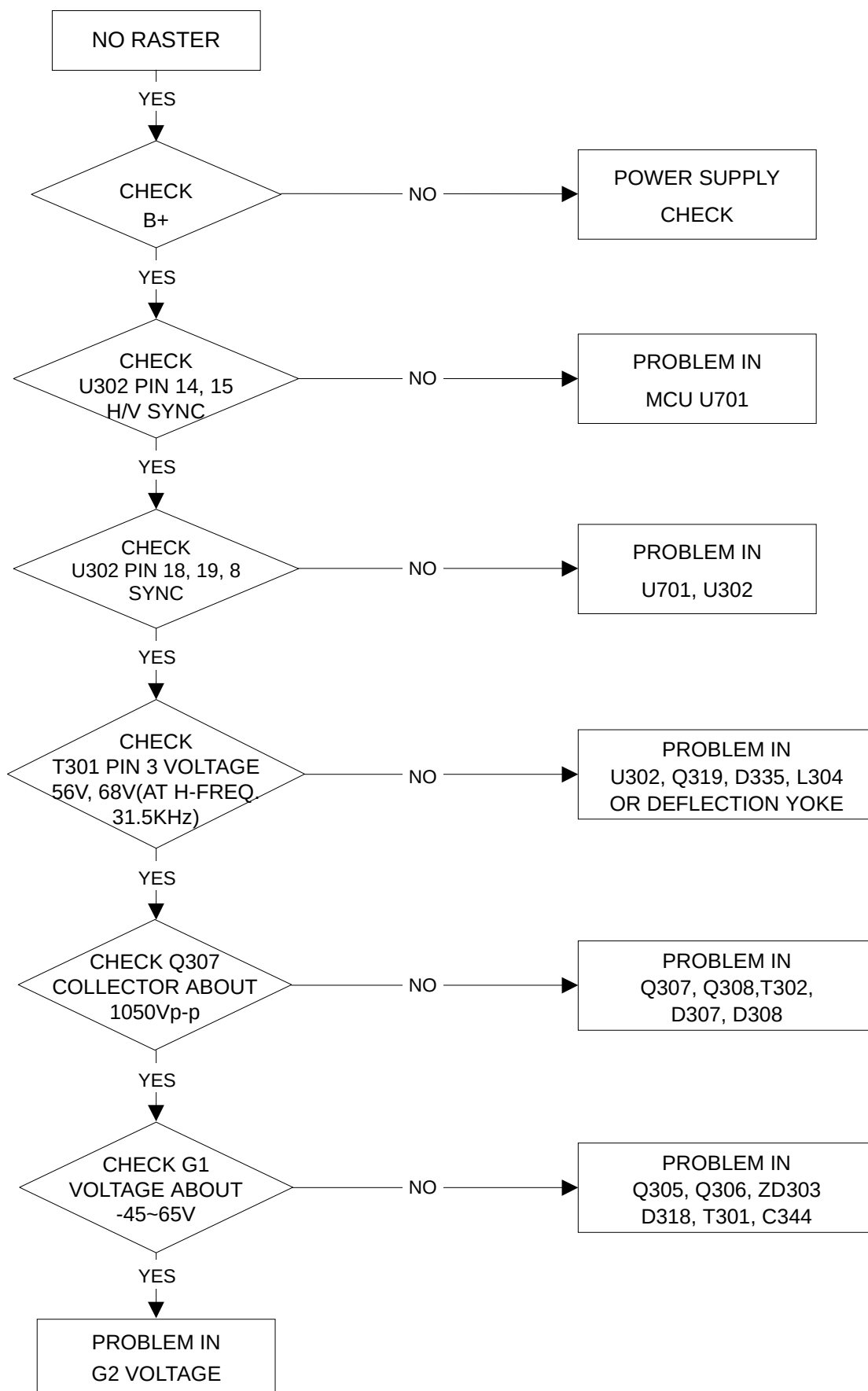
3. VIDEO NOISE, UNSYNCHRONOUS



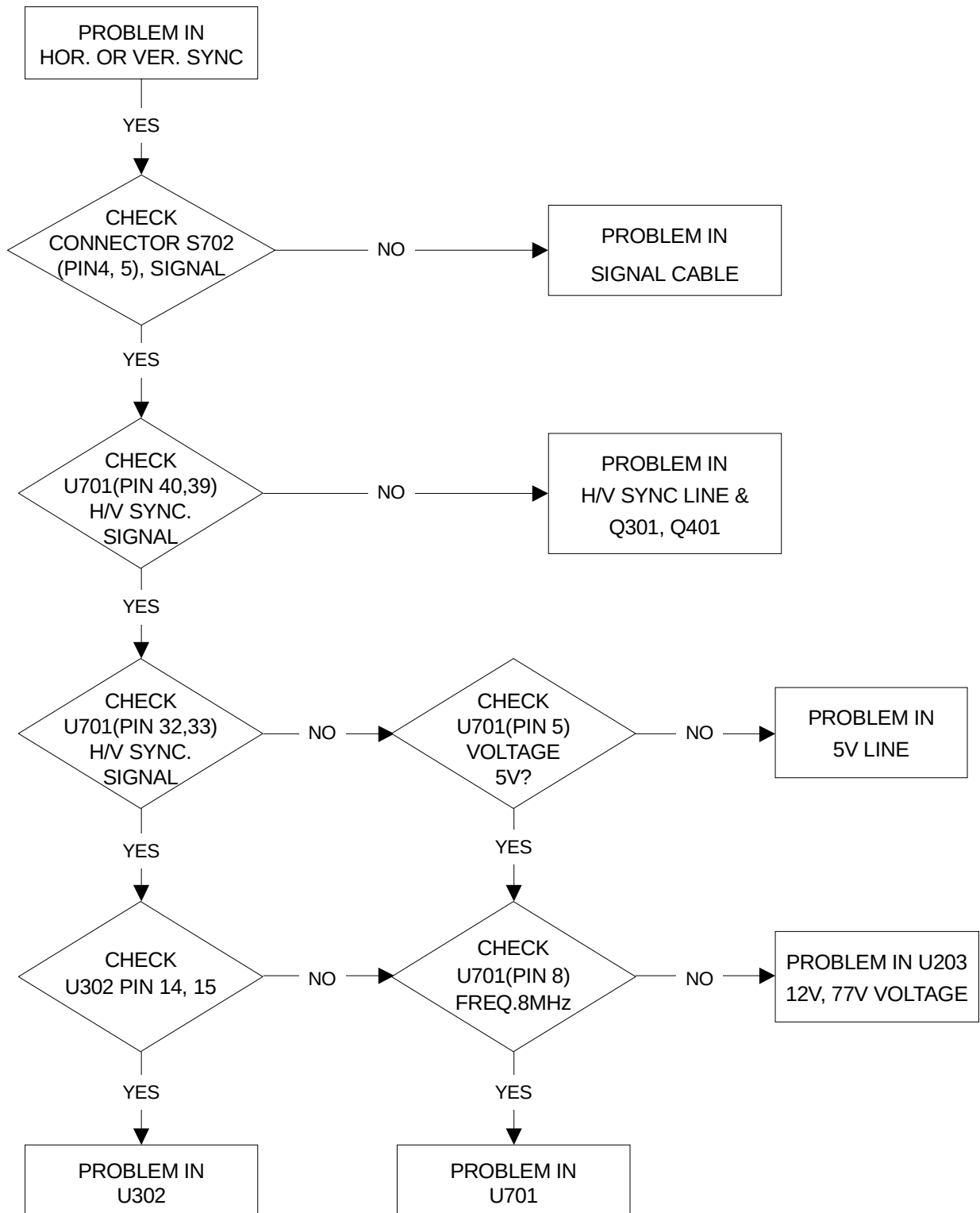
4. NO VIDEO



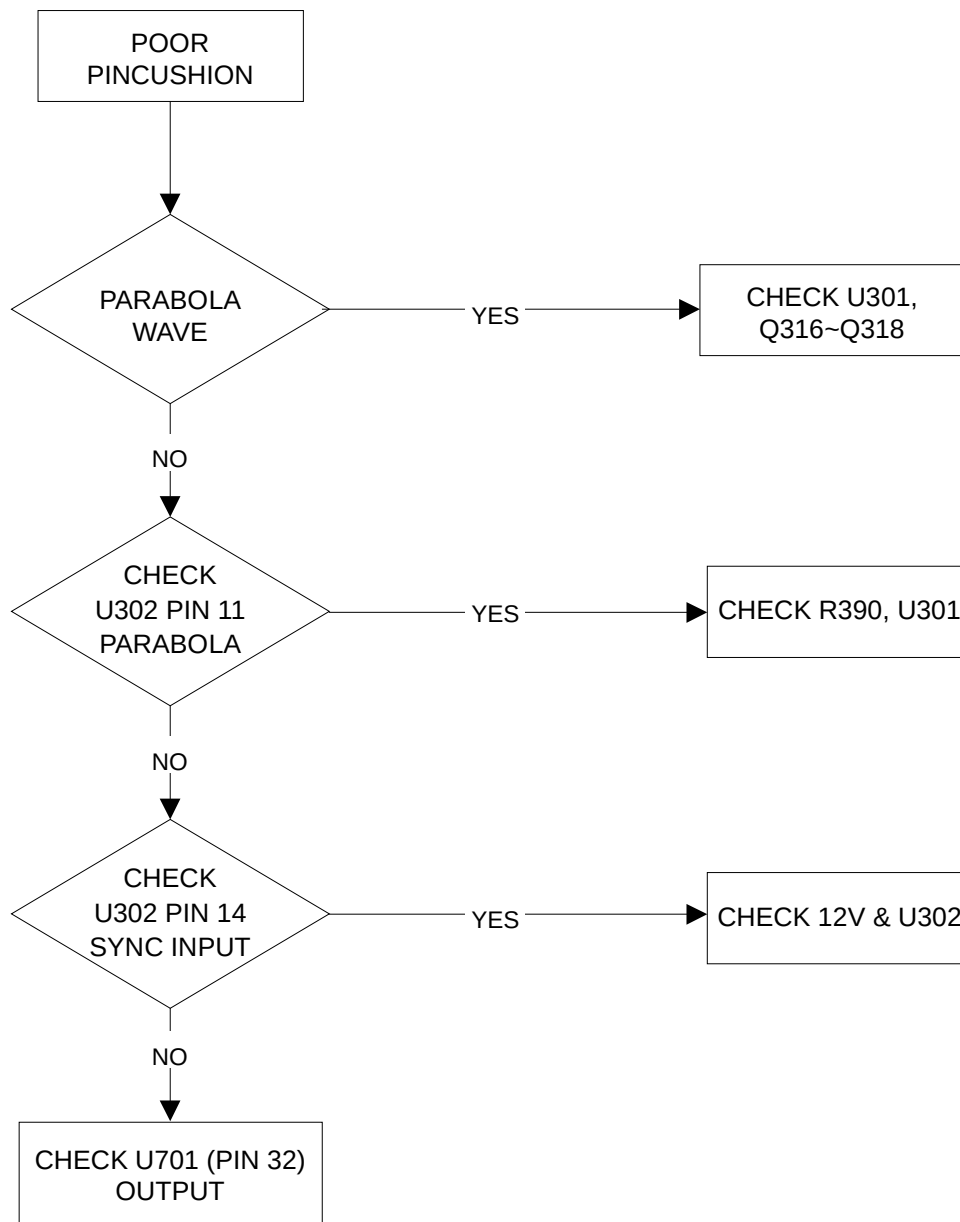
5. NO RASTER



6. TROUBLE IN H. V SYNC



7. POOR PINCUSHION



CIRCUIT DESCRIPTION

TABLE OF CONTENTS

	Page
1. Power supply circuit	38
2. MCU	41
3. Horizontal deflection signal processing/Vertical and geometrical compensation of the raster	57
4. Horizontal drive and power supply output	69
5. Horizontal amplitude control	70
6. Blanking and spot killer	71
7. Video amplifier system with on-screen display	72
8. Monolithic triple 13.5nS CRT driver	74
9. On screen display	78

1. Power supply circuit

① Outline

This power supply unit adopts the switching mode technology, and is an off-line mode type unit that provided several different DC outputs. The scanning frequency is available in different values ranging from 31 kHz to 69 kHz. Moreover, it is capable to operate at an AC input voltage of 100V ~ 240V and an AC frequency of 50-60 Hz $\pm$ 3Hz.

The block diagram is the functional construction schematics, that shows the major functions of this power supply unit.

② Harmonics (OPTION)

L107 is a harmonic choke circuit that reduces the harmonic peak currents, for the purpose of fulfilling the requirement items of IEC 1000-3-2.

③ EMI

The EMI circuit has a 2-stage construction, with the first stage consisting of the common mode choke unit and one X-capacitor, and the second stage consisting of the common mode choke unit and four Y-capacitors.

R101 is the bleed resistor of the X-capacitor. When the power supply switch is turned OFF, this resistor carries out the emergency charging of the capacitor C101.

The EMI is the circuit that prevents the monitor switching noise from being generated, there by minimizing the negative influence on the other electronic equipment.

④ AC rectifier and smoothing capacitor

The AC input is rectified by means of the full-bridge rectifier, that consists of the diodes D101 to D104. The AC voltage is converted into the DC voltage by passing through the next stage, that consists of the smoothing capacitor C105.

TH101 is a NTC thermistor for the power supply at the in-rush current limit.

⑤ Degaussing circuit

The degaussing circuit consists of the PTC thermistor TH102, the degaussing coil and the relay RL101. The relay is controlled by means of the +12V control signal coming from the CPU.

⑥ Transformer and energy induction

1) When the PWM controls IC KA3842A chip, a driving pulse is generated at the gate of the transistor Q101, and Q101 turns ON. The current returns from the "plus" (+) side of the energy-supplying capacitor C105 to the "minus" (-) side of the same capacitor C105, passing through the transformer Q101 D-S. During the ON cycle, the energy is stored in the transformer T101. The transistor Q101 turns OFF when the driving pulse disappears from Q101. As a result, all voltages of the dot ends of the winding flow to the positive direction and reach the fly-back rectifier. At that point of time, the diodes of the rectifier of the secondary side turn ON, a temporary energy is induced at the secondary side, and the ON cycle of the driving pulse is repeated.

- 2) The power supply MOS FET Q101 carries out the ON/OFF operation of the control unit, by means of U101 KA3842A. KA3842A is a PWM (pulse width modulation) IC chip, with 16 V starting voltage and 10 V cut-off voltage.

The following list shows the pin layout of KA3842A pulse width modulation IC chip.

Pin 1:	Feedback	Pin 2:	Compensation
Pin 3:	Current sensor	Pin 4:	Oscillator
Pin 5:	Ground (GND)	Pin 6:	Pulse output
Pin 7:	VCC	Pin 8:	VREF (5.1 V)

3) Overcurrent protection

R111 is a sensor resistor, and it has the function of increasing the current of this loop when the output of the secondary side is either in the overloaded state or is insufficient.

Since the current passing through the R111 sensor resistor has voltage dropping effect, the operation of the output pulse is stopped when a voltage lower than 1 Volt is detected at the pin number 3 of the KA3842A 3chip, and the switch of the power supply MOS FET is kept in the “break” state until the VCC voltage is charged up to 16 Volts, and the operation of U101 KA3842A is resumed. When it is not clearly known whether there is voltage shortage or not, however, this circuit repeats the ON/OFF switching, and the power supply LED lights up.

4) Starting circuit

The resistor R122 and R123 and the transistor U103 and diode D131 and resistor R169 and zener diode ZD101 are for the starting operation. When the circuit starts its operation, the power supply transformer T101 supplies the auxiliary 12 Volt power to the control IC chip U101 via pins 6 and 7 of the winding transformer T101.

5) Synchronization circuit

The synchronization signal is induced from the fly-back transformer (FBT), and carries out the synchronization with the power supply frequency. The frequency range is from 31 kHz to 70 kHz, and the component elements of the synchronization circuit are C114, R116, D109, R115 and R117.

6) Feedback circuit

The feedback circuit loop induces the 12 V voltage through the pin 6 and the pin 7 of the power supply transformer. That voltage is connected with the pin 3 of the IC chip U101 by passing through U103, R122, R123 and passing next through R10A, VR101 and R151. This is a regular loop.

7) Snubber circuit

The snubber circuit has the function of clamping the ON/OFF spikes of the power supply MOS-FET, and its component elements D105, C106, R106 make up a snubber that turns OFF the power supply MOS-FET.

8) Secondary rectifier and smoothing rectifier

The secondary rectifier is a harmonic rectifier consisting of D111, C124 and R128, and it works as a snubber circuit as well. The capacitors C120 and C138 are the smoothing rectifier working on the 49 Volt DC output. There are also other DC outputs, such as 80 Volt (D110), 13.5 Volt (D112) and 6.3 Volt (D113).

⑦ Power saving

Suspend mode : Every DC voltage operation of the CRT is turned OFF.

The color of the power LED101 switches from green to orange.

OFF mode : This is the mode in which the CPU control unit turns OFF the power supply, but the power turns ON when the user touches the keyboard.

The power LED switches to dark orange color.

- 1) When the power switch is turned ON when there is nothing being entered in the video cable. At that time, if the video is shifted from the free-run mode to the suspend mode, the transistor Q107 turns OFF and the operation returns to the OFF mode within a few seconds.
- 2) As for the sequence of steps that turn the operation to the OFF mode, if the keyboard is not touched for a given period of time that a preset in advance, the CPU outputs the LOW level signal to the transistor Q107, then Q105 turns OFF, the transistor Q108 and Q104 turns OFF. As a result the power is shut out at that state.
- 3) When the user touches the keyboard in the OFF mode, the operation is resumed, the video signals V-SYNC and H-SYNC turn ON the CPU via resistor R129 and R159, then the transistor Q105 and Q107 turn ON, the transistors Q104 and Q108 turn ON. As a result the operation returns to the ON state.

⑧ DC/DC

The DC/DC voltage is DC 49 volts, and since the set-up voltage is variable from 62 volts to 160 volts, it is variable depending on the horizontal synchronism. The frequency band is variable from 31 kHz to 69 kHz. The voltage is fed back from the fly-back transformer (FBT). The DC/DC output voltage is used as high-voltage input of FBT T301.

- 1) DC/DC is a step-up circuit, and consists mainly of the choke L304, the transistor Q319, the diode D335 and U302.
- 2) When the PWM controls U302 IC TDA4857, a driving pulse is generated at the gate of the transistor Q319, and the transistor Q319 turns ON. During the ON cycle, the energy is stored in the choke L304. The transistor Q319 turns OFF when the driving pulse disappears from the gate of the transistor Q319. As a result, the voltage at the dot terminal of the winding flows in the positive direction and goes to the fly-back rectifier. The energy stored in the choke L304 is entered in the FBT, passing through the choke L304, the diode D335 and the capacitor C307.
- 3) The feedback is detected by the FBT via diode D310, the capacitor C326, the resistor R349 the variable resistor VR302 and the fixed resistor R382, and is connected to the U302 pin 5. This is loop is the regular type one.
- 4) The frequency of the synchronization signal coming from video H-SYNC is variable from 31 kHz to 69 kHz. The circuit consists of the R30X.
- 5) The soft start circuit consists of the resistor R30P, the capacitor C309, the diode D303 and the Q326.

2. MCU

Monitor MCU Specification

Frequency Specification

H-freq. : 29.5K – 70KHz

V-freq. : 43 – 160Hz

Judge polarity only when frequency is 31.5 KHz and 37.8 KHz

Support composite sync detection

System Architecture

1. MCU – Weltrend WT6232, 32K bytes ROM size
2. EEPROM – 24C08 series, 8K bit, with ID code for identify initialization.
3. OSD – Myson MTV016N-12

Input

1. Sync input – 2 pins for H-sync & V-sync frequency inverted input.
2. Key input – 2 pins for A/D key input (SELECT, UP, DOWN and RECALL).
3. Burn-in ID input – 1 pins for Burn-in ID input.
4. Reset input – low pulse for reset MCU
5. Crystal input – 2 pins using 8MHz crystal.

Output – MCU digital pin

1. Degauss – Active high pulse for 2.5 sec when in degauss. MCU will activate degauss while power on.
2. CS output – 3 pins (CS2, CS1, CS0) for CS control

H-sync	CS2	CS1	CS0
H-sync < 33.25KHz	0	0	0
33.25KHz<H-sync<36.50KHz	0	1	0
36.50KHz<H-sync<40.50KHz	0	1	1
40.50KHz<H-sync<45.10KHz	1	0	0
45.10KHz<H-sync<51.60KHz	1	0	1
51.60KHz<H-sync<55.10KHz	1	1	0
55.10KHz<H-sync<62.15KHz	1	1	0
62.15KHz<H-sync	1	1	1
Mode change	0	0	0

3. Power saving – 2 pins (PMUS, PMUO) for power saving control

- if $H_f > 70\text{KHz}$ or $H_f < 23\text{KHz}$, enter power saving mode (suspend).
- enter power saving mode after 3 sec when condition met.
- enter suspend mode first for 3 sec before enter off mode if off mode condition met.

Mode	H-sync freq.	V-sync freq.	Burn-in ID	PMUS	PMUO
Normal	Yes	Yes	---	1	1
Stand By	No	Yes	---	0	1
Suspend	Yes	No	---	0	1
Off	No	No	Low	0	0
Burn-in	No	No	High	1	1

4. Mute – 2 pins for screen mute

Mute1 – active low pulse for about 0.6 sec when mode change.

Mute2 – active low pulse for about 1.0 sec when mode change, active with mute 1 simultaneously.

5. D/A – 14 pins (PWM output) are Brightness, Contrast, H-phase, H-size, V-center, V-size,

Pincushion, Trapezoid, Rotation, Parallel, Pin-balance, R-gain, G-gain and B-gain.

- DAC value 255 means the maximum output volts except Parallel PWM.
- All D/A except Rotation, Brightness, Contrast, R-gain G-gain B-gain are mode dependent functions.
- Parallel is voltage inverter function.

6. Sync output – 2 pins for H-sync and V-sync negative output, normal high.

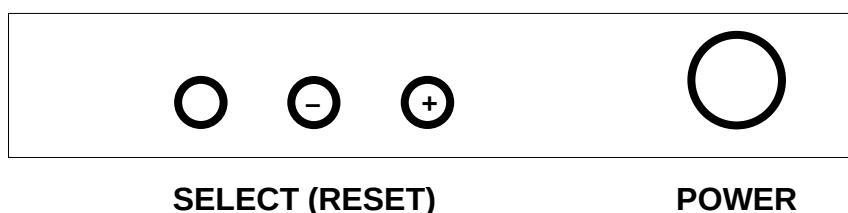
7. DDC – 2 pins (DDC SDA/DDC SCL) for DDC1/DDC2B or auto alignment control.

- In auto alignment mode, all keys and OSD are disabled.

8. SDA/SCL – 2 pins for EEPROM and OSD control.

9. WP – 1 pin, high for EEPROM write protect.

Control Panel Operation



1. Key arrangement – 3 keys for OSD control.

2. Hot key operation

- A. Factory Mode: SELECT Key + UP (+) Key if pressed when the power SW on.
- B. OSD Position Control Mode: DOWN (-) Key if pressed when the power SW on.
- C. Aging mode: Select key if pressed when the power SW on.

IIC interface

1. DDC1/DDC2B – VESA DDC1/DDC2B is supported.
2. Auto alignment – I²C auto alignment protocol is supported.

Timing Table

Total 24 modes.

1. Factory mode – 20 modes ‘*’ indicate do not care.

Mode	Resolution	H-sync.	V-sync.	H polarity	V polarity
1	VGA 350	31.5KHz	70Hz	+	-
2	VGA 400	31.5KHz	70Hz	-	+
3	VGA 480	31.5KHz	60Hz	-	-
4	MACII 35k	35.0KHz	66Hz	*	*
5	800*600(56)	35.2KHz	56Hz	*	*
6	8514A	35.5KHz	87Hz	*	*
7	640*480(75)	37.5KHz	75Hz	*	*
8	EVGA 400	37.8KHz	84Hz	-	+
9	800*600(60)	37.8KHz	60Hz	*	*
10	640*480(85)	43.3KHz	85Hz	*	*
11	800*600(75)	46.8KHz	75Hz	*	*
12	1024*768(60)	48.3KHz	60Hz	*	*
13	MACII 49k	49.7KHz	74Hz	*	*
14	800*600(85)	53.6KHz	85Hz	*	*
15	1024*768(70)	56.4KHz	70Hz	*	*
16	1024*768(75)	60.0KHz	75Hz	*	*
17	640*480(120)	63.7KHz	120Hz	*	*
18	1280*1024(60)	64.0KHz	60Hz	*	*
19	800*600(100)	64.0KHz	100Hz	*	*
20	1024*768(85)	68.6KHz	85Hz	*	*

‘*’ indicate do not care.

2. User mode – 4 modes
– FIFO replacement is applied.

GENERAL DESCRIPTION

The WT62P1 is a microcontroller for digital controlled monitor with Universal Serial Bus (USB) interface. It contains an 8-bit CPU, 32K bytes flash memory, 512 bytes RAM, 14 PWMs, parallel I/Os, SYNC signal processor, timer, DDC1/2B interface, master/slave I²C interface, low speed USB device module, 6-bit A/D converter and watch-dog timer.

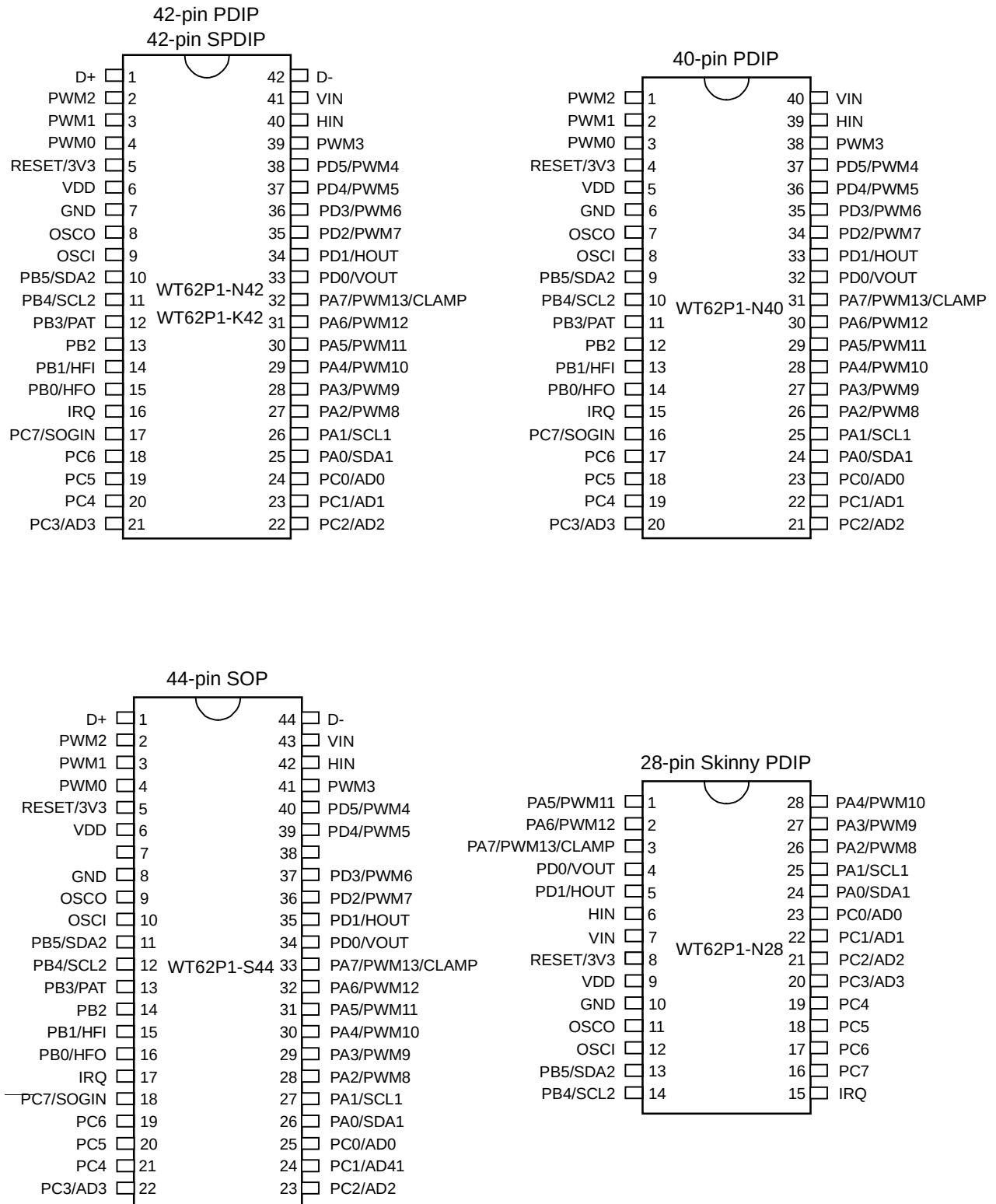
FEATURES

- * 8-bit 6502 compatible CPU with 6MHz operating frequency
- * 32768 bytes flash memory, 512 bytes SRAM
- * 12MHz crystal oscillator
- * 14 channels 8-bit PWM outputs
- * Sync signal processor with H+V separation, H/V frequency counter, H/V polarity detection/control and clamp pulse output
- * Six free-running sync signal outputs (Horizontal frequency up to 106kHz)
- * Self-test pattern
- * DDC1/2B supported
- * Fast mode master/slave I²C interface (up to 400kHz)
- * Embedded USB function with endpoint 0 and endpoint 1
- * Built-in 3.3V regulator for USB transceiver
- * Watch-dog timer
- * Maximum 28 programmable I/O pins
- * One 8-bit programmable timer
- * 6-bit A/D converter with 4 selectable inputs
- * One external interrupt request input
- * Low V_{DD} reset

ORDERING INFORMATION

Package Type	Part Number
42-pin PDIP	WT62P1-N42
42-pin Shrink PDIP	WT62P1-K42
40-pin PDIP	WT62P1-N40
28-pin skinny PDIP	WT62P1-N28
44-pin SOP	WT62P1-S44

PIN CONFIGURATION



PIN DESCRIPTION

Pin No.				Pin Name	I/O	Descriptions
40	42	40	28			
1	1	-	-	D+	O	USB D+ signal.
2	2	1	-	PWM2	O	PWM2 output (10V open-drain).
3	3	2	-	PWM1	O	PWM1 output (5V open-drain).
4	4	3	-	PWM0	I	PWM0 output (5V open-drain).
5	5	4	8	/RESET/3V3		Reset input and +3.3V regulator output for USB transceiver power supply.
6	6	5	9	VDD		+5V power supply.
7	-	-	-	NC	O	No Connection.
8	7	6	10	GND	I	Ground.
9	8	7	11	OSCO	I/O	12MHz oscillator output.
10	9	8	12	OSCI	I/O	12MHz oscillator input.
11	10	9	13	PB5/SDA2	I/O	Port B5 or I ² C interface data line.
12	11	10	14	PB4/SCL2	I/O	Port B4 or I ² C interface clock line.
13	12	11	-	PB3/PAT	I/O	Port B3 or test pattern output.
14	13	12	-	PB2	I/O	Port B2.
15	14	13	-	PB1/HFI	I/O	Port B1 or half frequency divider input.
16	15	14	-	PB0/HFO	I/O	Port B0 or half frequency divider output.
17	16	15	15	/IRQ	I/O	Interrupt request input, A low level on this can generate interrupt.
18	17	16	16	PC7/SOGIN	I/O	Port C7 or Sync on Green input.
19	18	17	17	PC6	I/O	Port C6.
20	19	18	18	PC5	I/O	Port C5.
21	20	19	19	PC4	I/O	Port C4.
22	21	20	20	PC3/AD3	I/O	Port C3 or ADC input 3.
23	22	21	21	PC2/AD2	I/O	Port C2 or ADC input 2.
24	23	22	22	PC1/AD1	I/O	Port C1 or ADC input 1.
25	24	23	23	PC0/AD0	I/O	Port C0 or ADC input 0.
26	25	24	24	PA0/SDA1	I/O	Port A0 or DDC interface SDA pin.
27	26	25	25	PA1/SCL1	I/O	Port A1 or DDC interface SCL pin.
28	27	26	26	PA2/PWM8	I/O	Port A2 or PWM8 output.
29	28	27	27	PA3/PWM9	I/O	Port A3 or PWM9 output.
30	29	28	28	PA4/PWM10	I/O	Port A4 or PWM10 output.
31	30	29	1	PA5/PWM11	I/O	Port A5 or PWM11 output.
32	31	30	2	PA6/PWM12	I/O	Port A6 or PWM12 output.
33	32	31	3	PA7/PWM13/ CLAMP	I/O	Port A7 or PWM13 output or clamp pulse output.
34	33	32	4	PD0/VOUT	O	Port D0 or Vsync output.
35	34	33	5	PD1/HOUT	O	Port D1 or Hsync output.
36	35	34	-	PD2/PWM7	O	Port D2 or PWM7 output.
37	36	35	-	PD3/PWM6	O	Port D3 or PWM6 output.
38	-	-	-	NC	O	No Connection.
39	37	36	-	PD4/PWM5	I	Port D4 or PWM5 output.
40	38	37	-	PD5/PWM4	I	Port D5 or PWM4 output.
41	39	38	-	PWM3		PWM3 output (10V open-drain)
42	40	39	6	HIN		Hsync input.
43	41	40	7	VIN		Vsync input.
44	42	-	-	D-		USB D- signal

FUNCTIONAL DESCRIPTION

CPU

8-bit 6502 compatible CPU operates at 6MHz. Address bus is 16-bit and data bus is 8-bit.

The non-maskable interrupt (/NMI) of 6502 is modified to be maskable and is defined as INT0 with higher priority. The interrupt request (/IRQ) of 6501 is defined as INT1 with lower priority.

Please refer the 6502 reference menu for more detail.

RAM

512 bytes RAM. Address is located from \$0080h to \$00FFh and \$0180h to \$02FFh.

RAM from \$0200h to \$027Fh and \$0280h to \$02FFh can be disabled individually to emulate different RAM size IC. (see Register \$0FFFh)

ROM

32768 bytes flash memory for program. Address is located from \$8000h to \$FFFFh.

The following addresses are reserved for special purpose:

\$FFFAh (low byte) and \$FFFBh (high byte) : INT0 interrupt vector.

\$FFFBh (low byte) and \$FFFDh (high byte) : program reset interrupt vector.

\$FFFEh (low byte) and \$FFFFh (high byte) : INT1 interrupt vector.

\$0000h : \$003Fh \$0040h : \$007Fh \$0080h : \$00FFh \$0100h : \$017Fh \$0180h : \$02FFh \$0300h : \$0FFEh \$0FFFh \$1000h : \$7FFFh \$8000h : : : : \$FFFFh	Registers Reserved 128 bytes RAM Reserved 384 bytes RAM Reserved Configuration Register Reserved Flash ROM
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System Reset

There are four reset sources of this controller. Fig. 1 shows the block diagram of reset logic.

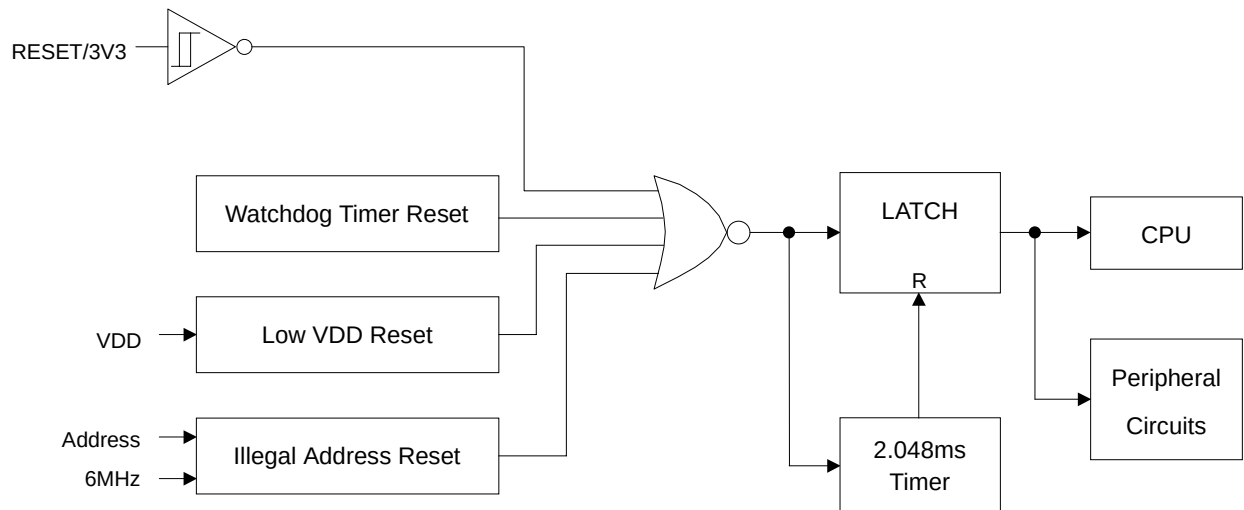


Fig. 1 Reset Signals

External Reset

A low level on the RESET/3.3V pin will generate reset.

Illegal address Reset

When the address bus of CPU goes to illegal address, a reset pulse will be generated.

The illegal address is defined as \$0040h~\$007Fh, \$0300h~\$0FFEh and \$1000h~\$7FFFh.

Low VDD Voltage Reset

When VDD is below 3.9V, an internal reset signal is generated. The reset signal will last 2.048 ms after the voltage is higher than 3.9V.

Watchdog Timer Reset

If a time-out happens when watchdog timer is enabled, a reset pulse is generated. Please refer watchdog timer section for more information.

I/O Port

I/O Port A

Pin PA0 and PA1 are shared with DDC interface SDA1 and SCL1. When ENDDC bit is "0", These two pins become I/O port. If PA0OE bit is set, Pin PA0 is an **open-drain** output. If PA0OE is cleared, Pin PA0 is an input pin with no internal pull-up resistor. The operation of PA1 is same as PA0. Fig. 2 Shows the structure of PA0.

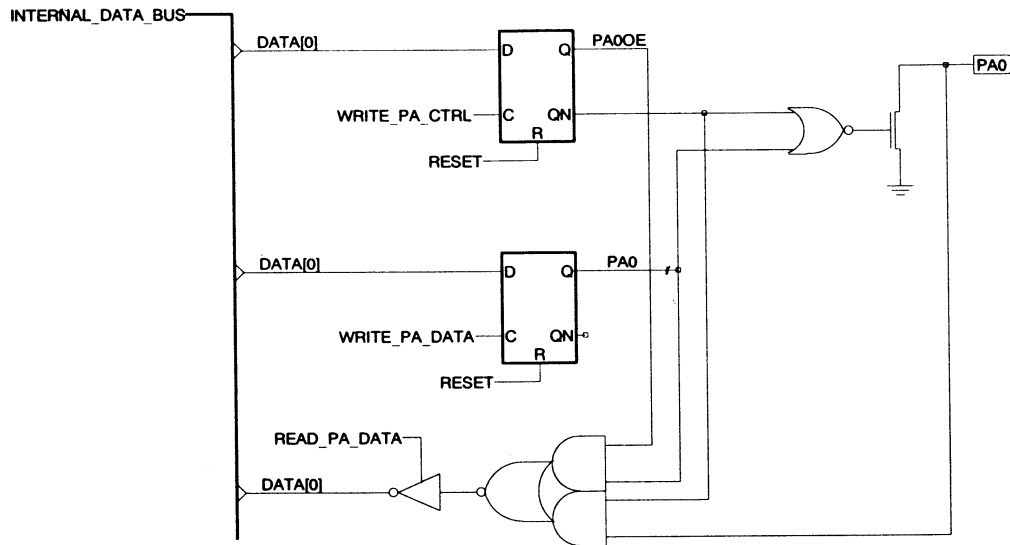


Fig.2 Structure of PA0 and PA1

Pin PA2 to PA6 are shared with PWM output. When corresponding EPWMx bit is "0", the pin is I/O port. If PAXOE bit is set, it is a push-pull type output. If PAXOE bit is cleared, it is an input pin with internal pull-up resistor.

Pin PA7 is shared with PWM13 output and clamp pulse output. When both EPWM13 bit and ENCLP bit are "0", this pin becomes I/O port. If PA7OE bit is set, it is a push-pull type output. If PA7OE bit is cleared, it is an input pin with internal pull-up resistor.

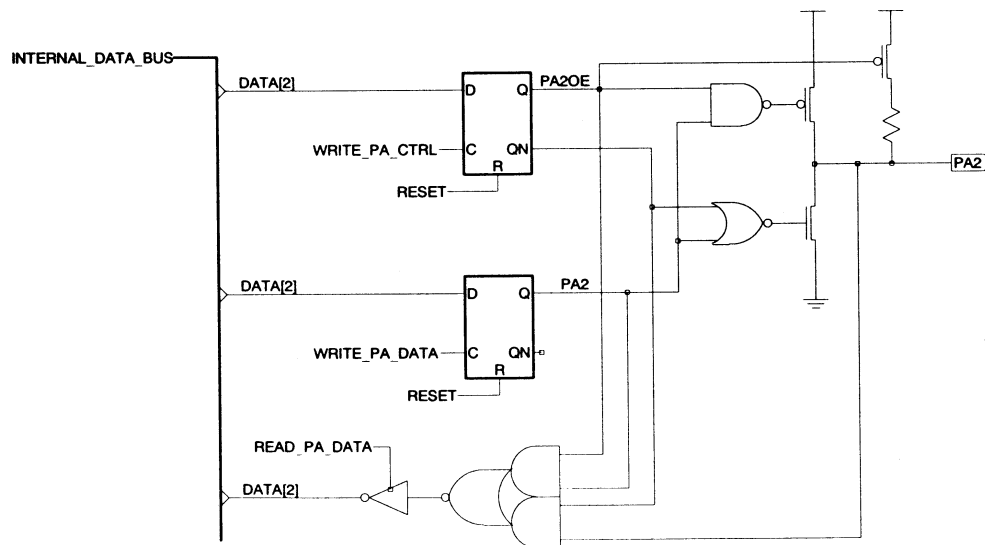


Fig.3 Structure of PA2

SYNC Processor

The functional block diagram of SYNC Processor is shown in Fig. 4. It contains H and V polarity detection circuit, H and V frequency counter, composite sync signal separation circuit, free-running H and V sync signal generator, video signal generation circuit for burn-in test and clamp pulse generator.

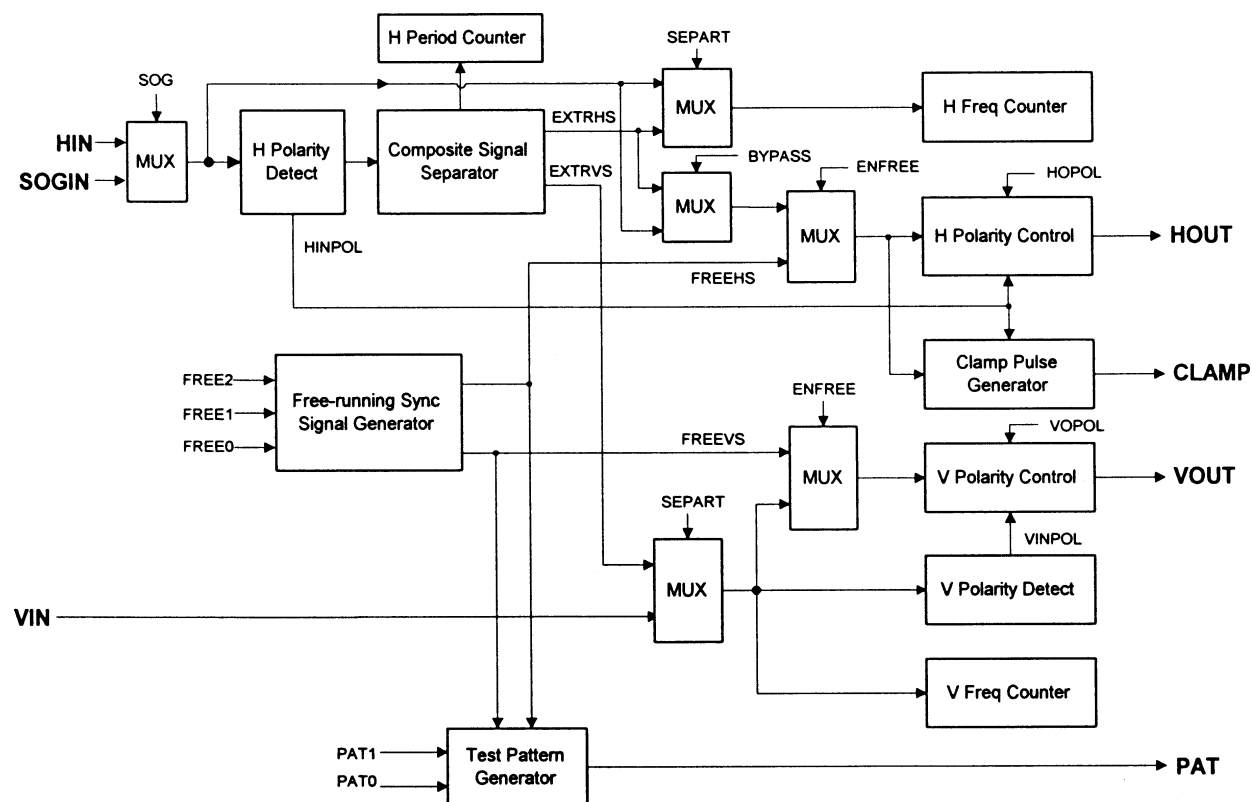


Fig.4 Block diagram of sync signal processor

Horizontal Polarity Detect

The horizontal polarity is detected by sampling HIN signal at 5.5~6.5us after rising and falling edge of HIN. If the result of sampling is low and lasts 192~256us with no change, the polarity is positive (HINPOL=1). If the result of sampling is high and lasts 192~256us with no change, the polarity is negative (HINPOL=0).

Vertical Polarity Detect

Vertical polarity is detected by sampling VIN level at 2.048ms after rising edge of VIN. If the level is low, the polarity is positive (VINPOL=1). If the level is high, the polarity is negative (VINPOL=0). But if SEPART bit is set, the VINPOL bit is "1" because the Vsync from composite signal separator is always positive polarity.

Output Polarity Control

The polarities of HOUT and VOUT are controlled by HOPOL and VOPOL bites. When the bit is set, the output polarity is positive. When the bit is cleared, the output polarity is negative.

Composite Sync Signal Separator

Composite sync signal separator extract Vsync signal from HIN or SOGIN input pin by filtering pulses which is less than 6 μ s. The output Vsync signal will be widened about 5.5~6.5 μ s. The output Hsync will be replaced by 2 μ s pulse during Vsync pulse.

The composite sync signal separator can handle H+V and H exclusive OR V signals. Fig. 5 shows the timing relationship of the extracted H and V sync signals.

If Hsync output do not want to insert pseudo H pulses (EXTRHS signal) during Vsync pulse, set BYPASS bit can let HOUT pin output waveform same as Hsync input (Note: polarity can be controlled by HOPOL bit).

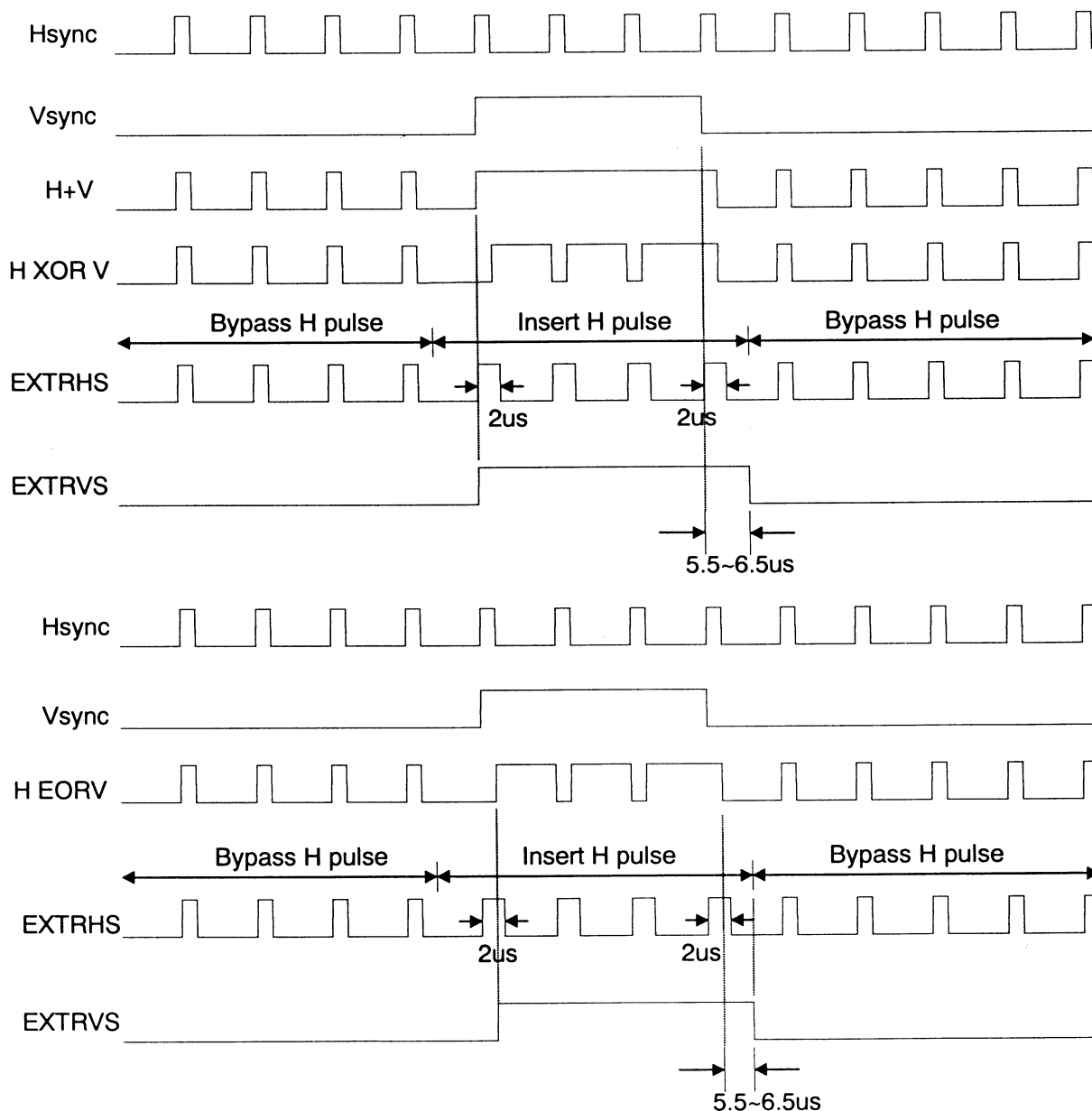


Fig.6 Timing relationship of composite sync signal separator

Free-running sync signal and self-test pattern

The self-generated free run sync signals are output from HOUT and VOUT pins when ENFREE bit is set. Four kinds of standard VESA timings are selected by FREE1 and FREE0 bits.

Self-test pattern signal is output form PAT pin when ENPAT bit is set. PAT1 and PAT0 bits select different self-test pattern.

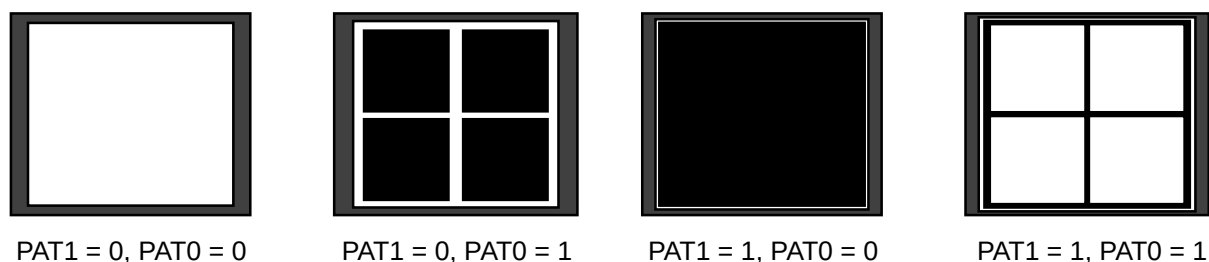


Fig. 7 Test Pattern

		X00	X01	010	011	110	111
F _H	Hor frequency	31.496kHz	48kHz	63.83kHz	81.25kHz	90.909kHz	106.195kHz
F _V	Ver frequency	59.993Hz	72.072Hz	59.878Hz	64.865Hz	84.8Hz	84.96Hz
T _{HT}	Hor total time	31.75us	20.833us	15.667us	12.333us	11us	9.417us
T _{VT}	Ver total time	16.669ms	13.875ms	16.7ms	15.417ms	11.792ms	11.771ms
T _{HS}	H sync time	3.833us	2.417us	1us	1.083us	1us	0.833us
T _{HB}	H Back porch + H Left border	2 us	1.417us	2.417us	1.833us	1.583us	1.417us
T _{HF}	H Front porch + H Right border	0.708us	1.125us	0.542us	0.375us	0.375us	0.292us
T _{VS}	V sync time	2 × T _{HT}	6 × T _{HT}	3 × T _{HT}	3 × T _{HT}	3 × T _{HT}	3 × T _{HT}
T _{VB}	V Back porch + V Top border	33 × T _{HT}	23 × T _{HT}	38 × T _{HT}	46 × T _{HT}	44 × T _{HT}	46 × T _{HT}
T _{VF}	V Front porch + V Bottom border	11 × T _{HT}	38 × T _{HT}	3 × T _{HT}	2 × T _{HT}	2 × T _{HT}	2 × T _{HT}
T _{VIDEO}	Video pulse width	41.67ns	41.67ns	41.67ns	41.67ns	41.67ns	41.67ns

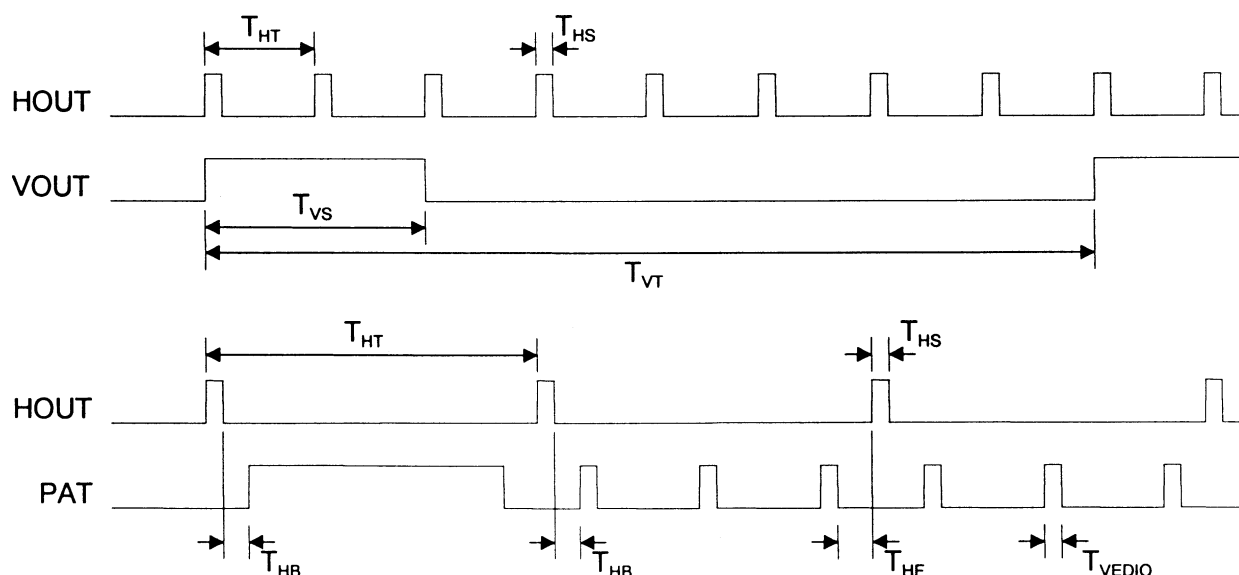
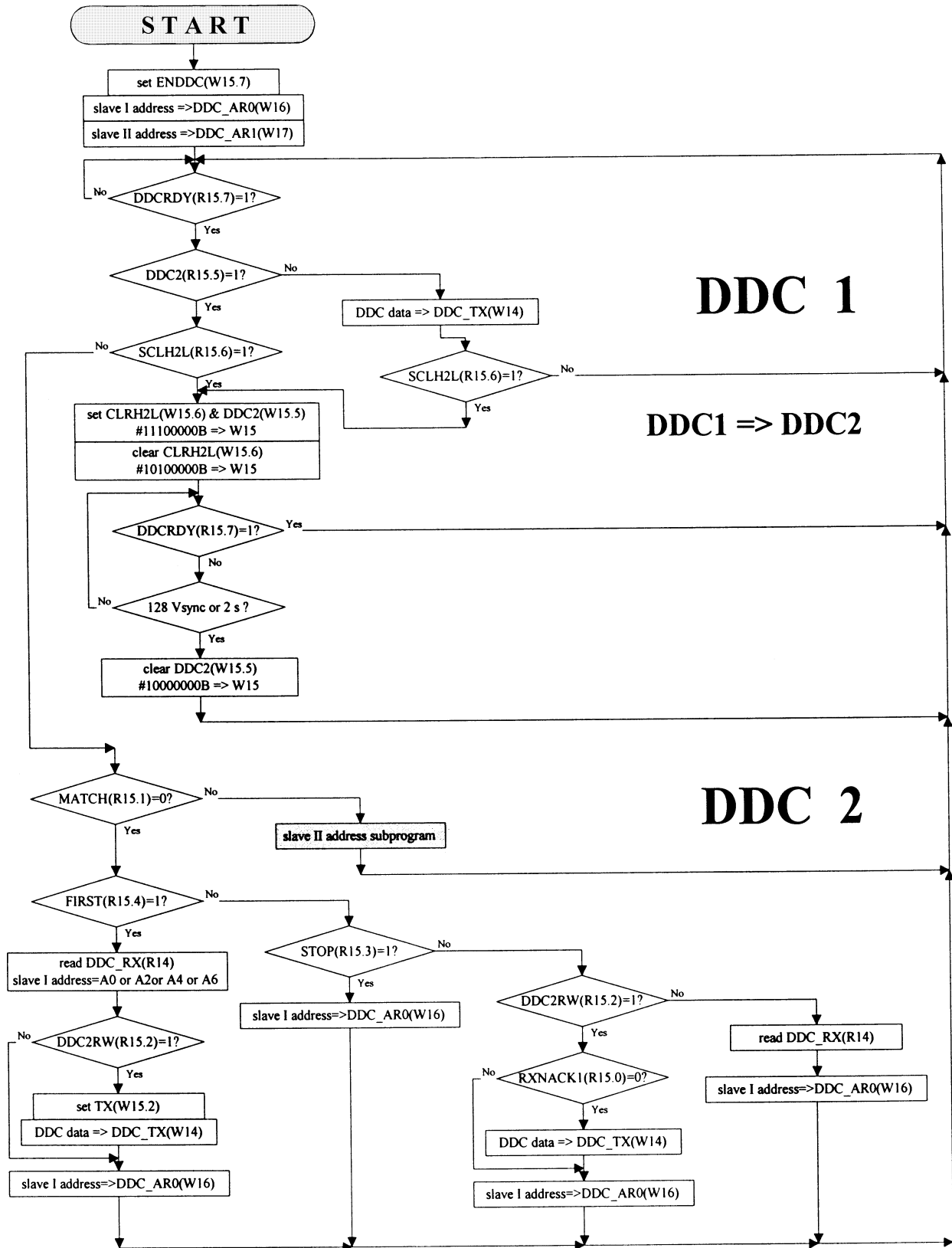
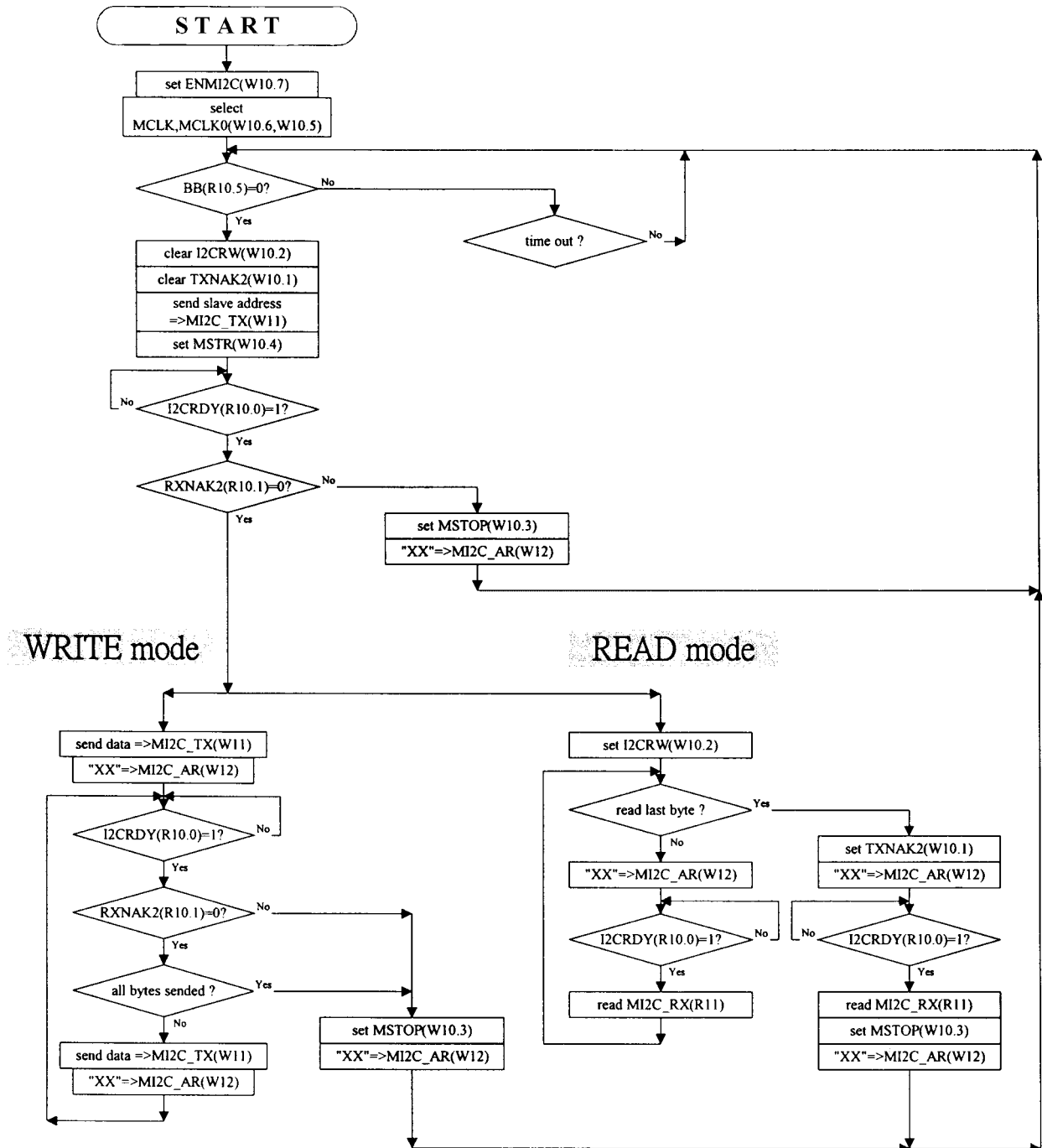


Fig.8 Free-running sync signal and test pattern timing

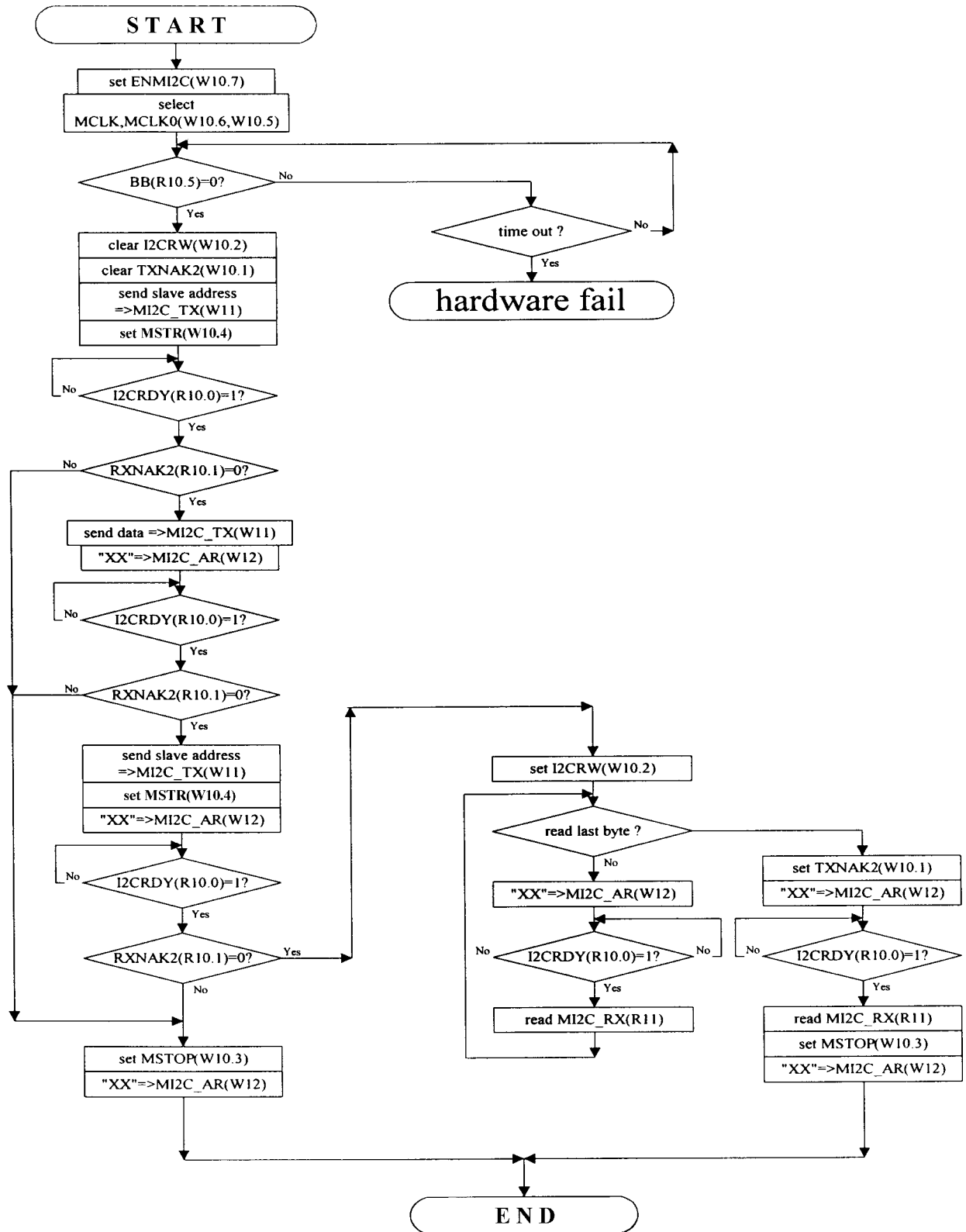
DDC Flow Chart



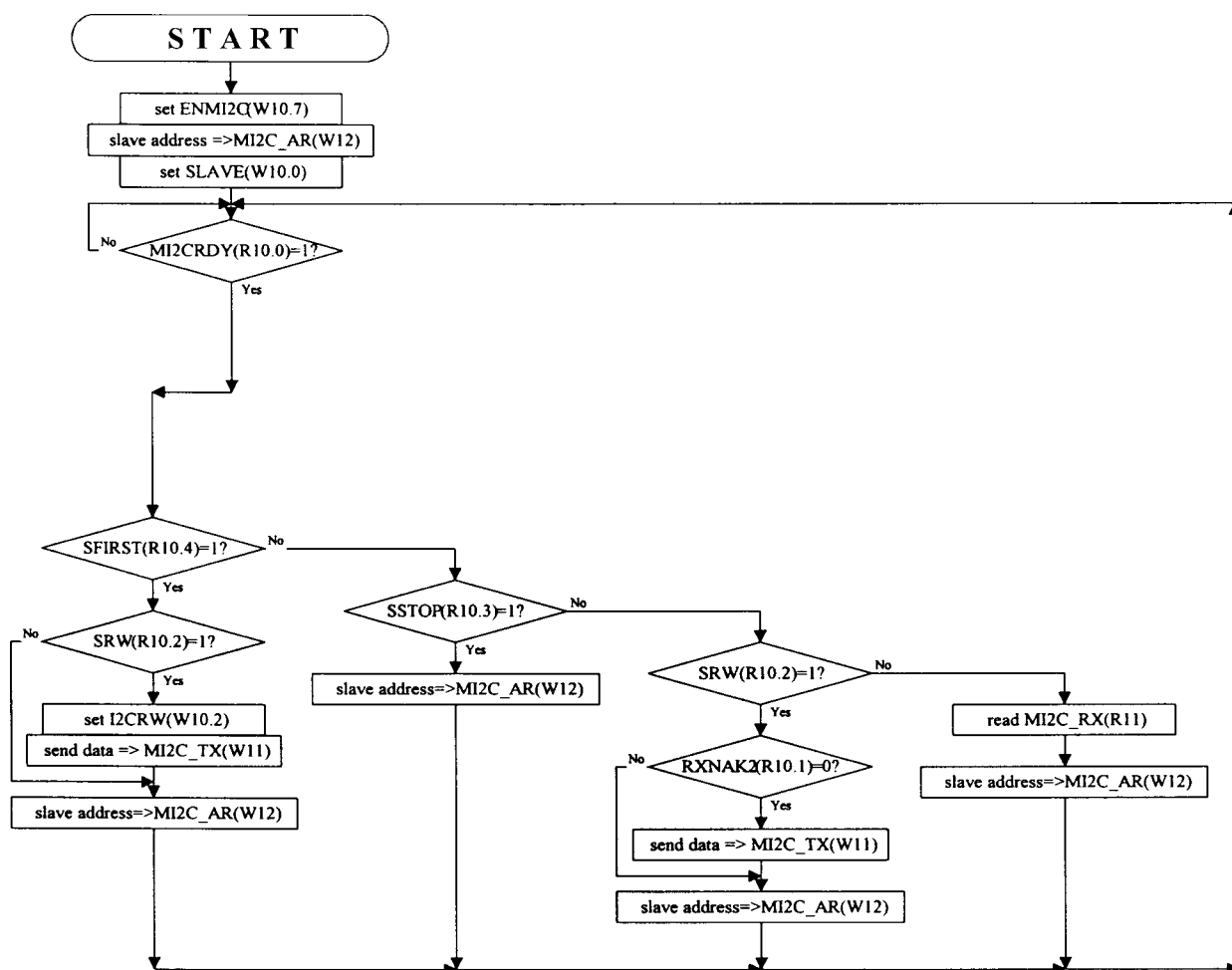
Master I²C Flow Chart



Master I²C (restart mode) Flow Chart



Slave I²C Flow Chart



FEATURES

Concept features

- Full horizontal plus vertical autosync capability
- Extended horizontal frequency range from 15 to 130kHz
- Comprehensive set of I²C-bus driven geometry adjustments and functions, including standby mode
- Very good vertical linearity
- Moire cancellation
- Start-up and switch-off sequence for safe operation of all power components
- X-ray protection
- Power dip recognition
- Flexible switched mode B+ supply function block for feedback and feed forward converter
- Internally stabilized voltage reference
- Drive signal for focus amplifiers with combined horizontal and vertical parabola waveforms
- DC controllable inputs for Extremely High Tension (EHT) Compensation
- SDIP32 Package

Synchronization

- Can handle all sync signals (horizontal, vertical, composite and sync-on-video)
- Output for video clamping (leading/trailing edge selectable by the I²C-bus), vertical blanking and protection blanking
- Output for fast unlock status of horizontal synchronization and blanking on grid 1 of picture tube.

Horizontal section

- I²C-bus controllable wide range linear picture position, pin unbalance and parallelogram correction via horizontal phase
- Frequency-locked loop for smooth catching of horizontal frequency
- Simple frequency preset of fmin and fmax by external resistors
- Low jitter
- Soft start for horizontal and B+ control drive signals.

Vertical section

- I²C-bus controllable vertical picture size, picture position, linearity (S-correction) and linearity balance
- Output for the I²C-bus controllable vertical sawtooth and parabola (for pin unbalance and parallelogram)
- Vertical picture size independent of frequency
- Differential current outputs for DC coupling to vertical booster
- 50 to 160 Hz vertical autosync range.

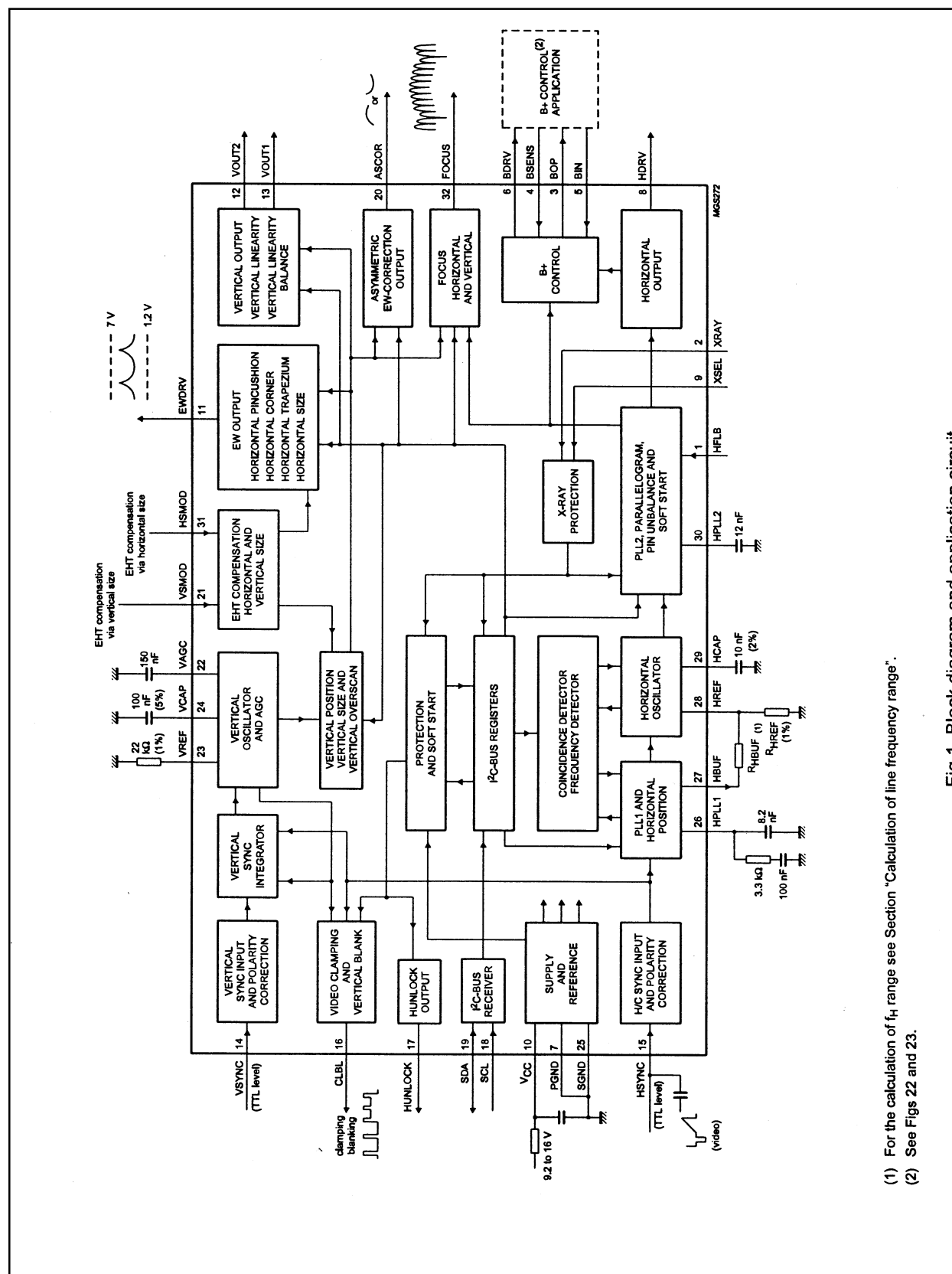
East-West (EW) section

- I²C-bus controllable output for horizontal pincushion, horizontal size, corner and trapezium correction
- Optional tracking of EW drive waveform with line frequency selectable by the I²C-bus.

Focus section

- I²C-bus controllable output for horizontal and vertical parabolas
- Vertical parabola is independent of frequency and tracks with vertical adjustments
- Horizontal parabola independent of frequency
- Adjustable pre-correction of delay in focus output stage.

BLOCK DIAGRAM



PINNING

SYMBOL	PIN	DESCRIPTION
HFLB	1	horizontal flyback input
XRAY	2	X-ray protection input
BOP	3	B+ control OTA output
BSENS	4	B+ control comparator input
BIN	5	B+ control OTA input
BDRV	6	B+ control driver output
PGND	7	power ground
HDRV	8	horizontal driver output
XSEL	9	select input for X-ray reset
Vcc	10	supply voltage
EWDRV	11	EW waveform output
VOUT2	12	vertical output 2 (ascending sawtooth)
VOUT1	13	vertical output 1 (descending sawtooth)
VSYNC	14	vertical synchronization input
HSYNC	15	horizontal/composite synchronization input
CLBL	16	video clamping pulse/vertical blanking output
HUNLOCK	17	horizontal synchronization unlock/protection/vertical blanking output
SCL	18	I ² C-bus clock input
SDA	19	I ² C-bus data input/output
ASCOR	20	output for asymmetric EW corrections
VSMOD	21	input for EHT compensation (via vertical size)
VAGC	22	external capacitor for vertical amplitude control
VREF	23	external resistor for vertical oscillator
VCAP	24	external capacitor for vertical oscillator
SGND	25	signal ground
HPLL1	26	external filter for PLL1
HBUF	27	buffered f/v voltage output
HREF	28	reference current for horizontal oscillator
HCAP	29	external capacitor for horizontal oscillator
HPLL2	30	external filter for PLL2/soft start
HSMOD	31	input for EHT compensation (via horizontal size)
FOCUS	32	output for horizontal and vertical focus

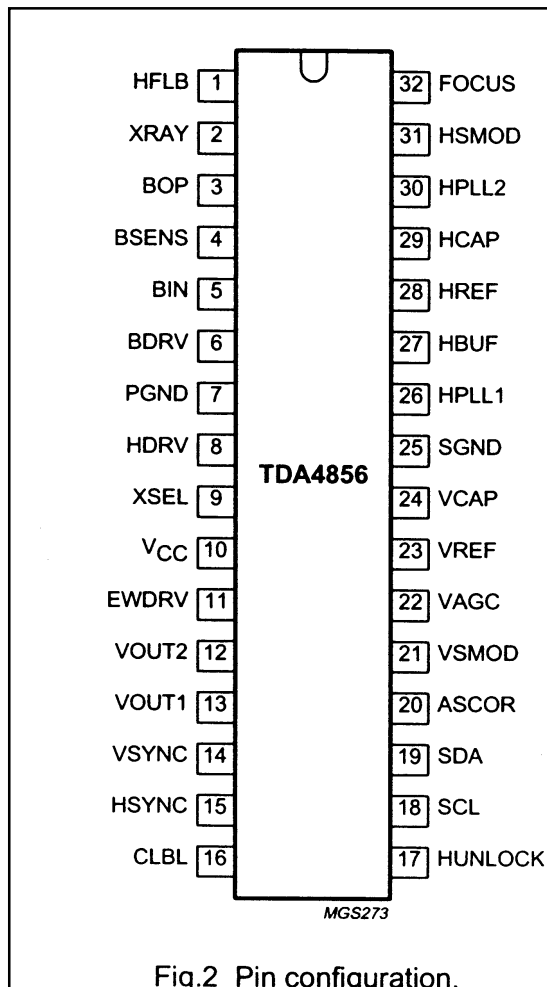


Fig.2 Pin configuration.

FUNCTIONAL DESCRIPTION

Horizontal sync separator and polarity correction

HSYNC (pin 15) is the input for horizontal synchronization signals, which can be DC-coupled TTL signals (horizontal or composite sync) and AC-coupled negative-going video sync signal. Video syncs are clamped to 1.28V and sliced at 1.4V. This results in a fixed absolute slicing level of 120 mV related to top sync.

For DC-coupled TTL signals the input clamping current is limited. The slicing level for TTL signals is 1.4 V.

The separated sync signal (either video or TTL) is integrated on an internal capacitor to detect and normalize the sync polarity.

Normalized horizontal sync pulses are used as input signals for the vertical sync integrator, the PLL1 phase detector and the frequency-locked loop.

Vertical sync integrator

Normalized composite sync signals from HSYNC are integrated on an internal capacitor in order to extract vertical sync pulses. The integration time is dependent on the horizontal oscillator reference current at HREF (pin 28). The integrator output directly triggers the vertical oscillator.

Vertical sync slicer and polarity correction

Vertical sync signals (TTL) applied to VSYNC (pin 14) are sliced at 1.4V. The output signal of the sync slicer is integrated on an internal capacitor to detect and normalize the sync polarity. The output signals of vertical sync integrator and sync normalizer are disjuncted before they are fed to the vertical oscillator.

Video clamping/vertical blanking generator

The video clamping/vertical blanking signal at CLBL (pin 16) is a two-level sandcastle pulse which is especially suitable for video ICs such as the TDA488x family, but also for direct applications in video output stages.

The upper level is the video clamping pulse, which is triggered by the horizontal sync pulse. Either the leading or trailing edge can be selected by setting control bit CLAMP via the I²C-bus. The width of the video clamping pulse is determined by an internal single-shot multivibrator.

The lower level of the sandcastle pulse is the vertical blanking pulse, which is derived directly from the internal oscillator waveform. It is started by the vertical sync and stopped with the start of the vertical scan. This results in optimum vertical blanking. Two different vertical blanking times are accessible, by control bit VBLK, via the I²C-bus.

Blanking will be activated continuously if one of the following conditions is true:

- Soft start of horizontal and B+ drive [voltage at HPLL2 (pin 30) pulled down externally or by the I²C-bus]
- PLL1 is unlocked while frequency-locked loop is in search mode
- No horizontal flyback pulses at HFLB (pin 1)
- X-ray protection is activated
- Supply voltage at Vcc (pin 10) is low

Horizontal unlock blanking can be switched off, by control bit BLKDIS, via the I²C-bus while vertical blanking is maintained.

Frequency-locked loop

The frequency-locked loop can lock the horizontal oscillator over a wide frequency range. This is achieved by a combined search and PLL operation. The frequency range is preset by two external resistors and the

recommended maximum ratio is $\frac{f_{\max}}{f_{\min}} = \frac{6.5}{1}$

This can, for instance, be a range from 15.625 to 90kHz with all tolerance included.

Without a horizontal sync signal the oscillator will be free-running at $f_{\min}$. Any change of sync conditions is detected by the internal coincidence detector. A deviation of more than 4% between horizontal sync and oscillator frequency switches the horizontal section into search mode. This means that PLL1 control currents are switched off immediately. The internal frequency detector then starts tuning the oscillator. Very small DC currents at HPLL1 (pin 26) are used to perform this tuning with a well defined change rate. When coincidence between horizontal sync and oscillator frequency is detected, the search mode is first replaced by a soft-lock mode which lasts for the first part of the next vertical period.

The soft-lock mode is then replaced by a normal PLL operation. This operation ensures smooth tuning and avoids fast changes of horizontal frequency during catching.

In this concept it is not allowed to load HPLL1.

The frequency dependent voltage at this pin is fed internally to HBUF (pin 27) via a sample-and-hold and buffer stage. The sample-and-hold stage removes all disturbances caused by horizontal sync or composite vertical sync from the buffered voltage. An external resistor connected between pins HBUF and HREF defines the frequency range.

Out-of-lock indication (pin HUNLOCK)

Pin HUNLOCK is floating during search mode, or if a protection condition is true. All this can be detected by the microcontroller if a pull-up resistor is connected to its own supply voltage.

For an additional fast vertical blanking at grid 1 of the picture tube a 1 V signal referenced to ground is available at this output. The continuous protection blanking (see Section "Video clamping/vertical blanking generator") is also available at this pin. Horizontal unlock blanking can be switched off, by control bit BLKDIS via the I²C-bus while vertical blanking is maintained.

Horizontal oscillator

The horizontal oscillator is of the relaxation type and requires a capacitor of 10 nF at HCAP (pin 29). For optimum jitter performance the value of 10 nF must not be changed.

The minimum oscillator frequency is determined by a resistor from HREF to ground. A resistor connected between pins HREF and HBUF defines the frequency range.

The reference current at pin HREF also defines the integration time constant of the vertical sync integration.

Calculation of line frequency range

The oscillator frequencies $f_{\min}$ and $f_{\max}$ must first be calculated. This is achieved by adding the spread of the relevant components to the highest and lowest sync frequencies $f_{\text{sync}(\min)}$ and $f_{\text{sync}(\max)}$. The oscillator is driven by the currents in R_{HREF} and R_{HBUF} .

The following example is a 31.45 to 90 kHz application:

Table 1 Calculation of total spread

spread of	for $f_{\max}$	for $f_{\min}$
IC	$\pm 3\%$	$\pm 5\%$
CHCAP	$\pm 2\%$	$\pm 2\%$
R _{HREF} , R _{HBUF}	$\pm 2\%$	$\pm 2\%$
Total	$\pm 7\%$	$\pm 9\%$

Thus the typical frequency range of the oscillator in this example is:

$$f_{\max} = f_{\text{sync}(\max)} \times 1.07 = 96.3 \text{ kHz}$$

$$f_{\min} = \frac{f_{\text{sync}(\min)}}{1.09} = 28.4 \text{ kHz}$$

The resistors R_{HREF} and $R_{\text{HBUF}_{\text{par}}}$ can be calculated using the following formulae:

$$R_{\text{HREF}} = \frac{78 \times \text{kHz} \times \text{k}\Omega}{f_{\min} + 0.0012 \times f_{\min}^2 [\text{kHz}]} = 2.61 \Omega$$

$$R_{\text{HBUF}_{\text{par}}} = \frac{78 \times \text{kHz} \times \text{k}\Omega}{f_{\max} + 0.0012 \times f_{\max}^2 [\text{kHz}]} = 726 \Omega$$

The resistor $R_{\text{HBUF}_{\text{par}}}$ is calculated as the value to R_{HREF} and R_{HBUF} in parallel.

The formulae for R_{HBUF} also takes into account the voltage swing across this resistor:

$$R_{HBUF} = \frac{R_{HREF} \times R_{HBUFpar}}{R_{HREF} - R_{HBUFpar}} \times 0.8 = 805 \Omega$$

PLL1 phase detector

The phase detector is a standard type using switched current sources, which are independent of horizontal frequency. It compares the middle of horizontal sync with a fixed point on the oscillator sawtooth voltage. The PLL1 loop filter is connected to HPLL1 (pin 26).

See also Section "Horizontal position adjustment and corrections".

Horizontal position adjustment and corrections

Alinear adjustment of the relative phase between the horizontal sync and the oscillator sawtooth (in PLL1 loop) is achieved via register HPOS. Once adjusted, the relative phase remains constant over the whole frequency range.

Correction of pin unbalance and parallelogram is achieved by modulating the phase between oscillator sawtooth and horizontal flyback (in loop PLL2) via registers HPARAL and HPINBAL. If those asymmetric EW corrections are performed in the deflection stage, both registers can be disconnected from the horizontal phase via control bit ACD. This does not change the output at pin ASCOR.

Horizontal moire cancellation

To achieve a cancellation of horizontal moire (also known as 'video moire'), the horizontal frequency is divided-by-two to achieve a modulation of the horizontal phase via PLL2. The amplitude is controlled by register HMOIRE. To avoid a visible structure on screen the polarity changes with half of the vertical frequency.

Control bit MOD disables the moire cancellation function.

PLL2 phase detector

The PLL2 phase detector is similar to the PLL1 detector and compares the line flyback pulse at HFLB (pin 1) with the oscillator sawtooth voltage. The control currents are independent of the horizontal frequency. The PLL2 detector thus compensates for the delay in the external horizontal deflection circuit by adjusting the phase of the HDRV (pin 8) output pulse.

An external modulation of the PLL2 phase is not allowed, because this would disturb the pre-correction of the horizontal focus parabola.

Soft start and standby

If HPLL2 is pulled to ground, either by an external DC current or by resetting register SOFTST, the horizontal output pulses and B+ control driver pulses will be inhibited. This means that HDRV (pin 8) and BDRV (pin 6) are floating in this state. In both cases PLL2 and the frequency-lock loop are disabled, and CLBL (pin 16) provides a continuous blanking signal and HUNLOCK (pin 17) is floating.

This option can be used for soft start, protection and power-down modes. When pin HPLL2 is released again, an automatic soft start sequence on the horizontal drive as well as on the B-drive output will be performed.

A soft start can only be performed if the supply voltage for the IC is a minimum of 8.6V.

The soft start timing is determined by the filter capacitor at HPLL2 (pin 30), which is charged with a constant current during soft start. In the beginning the horizontal driver stage generates very small output pulses. The width of these pulses increases with the voltage at HPLL2 until the final duty cycle is reached. The voltage at HPLL2 increases further and performs a soft start at BDRV (pin 6) as well. After BDRV has reached full duty cycle, the voltage at HPLL2 continues to rise until HPLL2 enters its normal operating range. The internal charge current is now disabled. Finally PLL2 and the frequency-locked loop are activated. If both functions reach normal operation, HUNLOCK (pin 17) switches from the floating status to normal vertical blanking, and continuous blanking at CLBL (pin 16) is removed.

Output stage for line drive pulses [HDRV (pin 8)]

An open-collector output stage allows direct drive of an inverting driver transistor because of a low saturation voltage of 0.3V at 20mA. To protect the line deflection transistor, the output stage is disabled (floating) for a low supply voltage at Vcc.

The duty cycle of line drive pulses is slightly dependent on the actual horizontal frequency. This ensures optimum drive conditions over the whole frequency range.

X-ray protection

The X-ray protection input XRAY (pin 2) provides a voltage detector with a precise threshold. If the input voltage at XRAY exceeds this threshold for a certain time, then control bit SOFTST is reset, which switches the IC into protection mode. In this mode several pins are forced into defined states:

HUNLOCK (pin 17) is floating

The capacitor connected to HPLL2 (pin 30) is discharged

Horizontal output stage (HDRV) is floating

B+ control driver stage (BDRV) is floating

CLBL provides a continuous blanking signal.

There are two different methods of restarting ways the IC:

1. XSEL (pin 9) is opeb-circuit or connected to ground. The control bit SOFTST must be set to logic 1 via the I²C-bus. Then the IC returns to normal operation via soft start.
2. XSEL (pin 9) is connected to Vcc via an external resistor. The supply voltage of the IC must be switched off for a certain period of time, before the IC can be restarted again using the standard power-on procedure.

Vertical oscillator and amplitude control

This stage is designed for fast stabilization of vertical size after changes in sync frequency conditions.

The free-running frequency $f_{fr(V)}$ is determined by the resistor R_{VREF} connected to pin 23 and the capacitor C_{VCAP} connected to pin 24. The value of R_{VREF} is not only optimized for noise and linearity performance in the whole vertical and EW section, but also influences several internal reference. Therefore the value of R_{VREF} must not be changed. Capacitor C_{VCAP} should be used to select the free-running frequency of the vertical oscillator in accordance with the following formula:

$$f_{fr(V)} = \frac{1}{10.8 \times R_{VREF} \times C_{VCAP}}$$

To achieve a stabilized amplitude the free-running frequency $f_{fr(V)}$, without adjustment, should be at least 10% lower than the minimum trigger frequency.

The contributions shown in Table 2 can be assumed.

Table 2 Calculation of $f_{fr(V)}$ total spread

Contributing elements	
Minimum frequency offset between $f_{fr(V)}$ and lowest trigger frequency	10%
Spread of IC	±3%
Spread of R_{VREF}	±1%
Spread of C_{VCAP}	±5%
Total	19%

Result for 50 to 160Hz application:

$$f_{fr(V)} = \frac{50 \text{ Hz}}{1.19} = 42 \text{ Hz}$$

The AGC of the vertical oscillator can be disabled by setting control bit AGCDIS via the I²C-bus. A precise external current has to be injected into VCAP (pin 24) to obtain the correct vertical size. This special application mode can be used when the vertical sync pulses are serrated (shifted); this condition is found in some display modes, e.g. when using a 100Hz up converter for video signals.

Application hint: VAGC (pin 22) has a high input impedance during scan. Therefore, the pin must not be loaded externally otherwise non-linearities in the vertical output currents may occur due to the changing charge current during scan.

Adjustment of vertical size, VGA overscan and EHT compensation

There are four different ways to adjust the amplitude of the differential output currents at VOUT1 and VOUT2.

- 1 Register VGIN changes the vertical size without affecting any other output signal of the IC. This adjustment is meant for factory alignments.
- 2 Register VSIZE changes not only the vertical size, but also provides the correct tracking of all other related waveforms (see section "Tracking of vertical adjustments"). This register should be used for user adjustments.
- 3 For the VGA350 mode register VOVSCN can activate a +17% step in vertical size.
- 4 VSMOD (pin 21) can be used for a DC controlled EHT compensation of vertical size by correcting the differential output currents at VOUT1 and VOUT2. The EW waveforms, vertical focus, pin unbalance and parallelogram corrections are not affected by VSMOD.

Adjustment of vertical position, vertical linearity and vertical linearity balance

Register VOFFS provides a DC shift at the sawtooth outputs VOUT1 and VOUT2 (pin 13 and 12) without affecting any other output waveform. This adjustment is meant for factory alignments.

Register VPOS provides a DC shift at the sawtooth output VOUT1 and VOUT2 with correct tracking of all other related waveforms (see Section "Tracking of vertical adjustments"). This register should be used for user adjustments. Due to the tracking the whole picture moves vertically while maintaining the correct geometry.

Register VLIN is used to adjust the amount of the vertical S-correction in the output signal. This function can be switched off by control bit VSC.

Register VLINBAL is used to correct the unbalance of vertical S-correction in the output signal.

Tracking of vertical adjustments

The adjustments via registers VSIZE, VOVSCN and VPOS also affect the waveforms of horizontal pincushion, vertical linearity (S-correction), vertical linearity balance, focus parabola, pin unbalance and parallelogram correction. The result of this interaction is that no readjustment of these parameters is necessary after an user adjustment of vertical picture size and vertical picture position.

Adjustment of vertical moire cancellation

To achieve a cancellation of vertical moire (also known as 'scan moire') the vertical picture position can be modulated by half the vertical frequency. The amplitude of the modulation is controlled by register VMOIRE and can be switched off via control bit MOD.

Horizontal pincushion (including horizontal size, corner correction and trapezium correction)

EWDRV (pin 11) provides a complete EW drive waveform. The components horizontal pincushion, horizontal size, corner correction and trapezium correction are controlled by the registers HPIN, HSIZE, HCORT, HCORB and HTRAP.

The corner correction can be adjusted separately for the top (HCORT) and bottom (HCORB) part of the picture.

The pincushion (EW parabola) amplitude, corner and trapezium correction track with the vertical picture size (VSIZE) and also with the adjustment for vertical picture position (VPOS). The corner correction does not track with the horizontal pincushion (HPIN).

Further the horizontal pincushion amplitude, corner and trapezium correction track with the horizontal picture size, which is adjusted via register HSIZE and the analog modulation input HSMOD. If the DC component in the EWDRV output signal is increased via HSIZE or HSMOD, the pincushion, corner and trapezium component of the EWDRV output will be reduced by a factor of

$$1 - \frac{V_{HSIZE} + V_{HEHT} \left(1 - \frac{H_{HSIZE}}{14.4V} \right)}{14.4V}$$

The value 14.4V is a virtual voltage for calculation only. The output pin can not reach this value, but the gain (and DC bias) of the external application should be such that the horizontal deflection is reduced to zero when EWDRV reaches 14.4V.

HSMOD (pin 31) can be used for a DC controlled EHT compensation by correcting horizontal size, horizontal pincushion, corner and trapezium. The control range at this pin tracks with the actual value of HSIZE. For an increasing DC component V_{HSIZE} in the EWDRV output signal, the DC component V_{HEHT} caused by I_{HSMOD} will be reduced by a

factor of $1 - \frac{V_{HSIZE}}{14.4V}$ as shown in the equation above.

The whole EWDRV voltage is calculated as follows:

$$V_{EWDRV} = 1.2V + [V_{HSIZE} + V_{HEHT} \times f(HSIZE) + (V_{HPIN} + V_{HCOR} + V_{HTRAP}) \times g(HSIZE, HSMOD)] \times h(I_{HREF}) \text{ where:}$$

$$V_{HEHT} = \frac{I_{HSMOD}}{120\mu A} \times 0.69$$

$$f(HSIZE) = 1 - \frac{V_{HSIZE}}{14.4V}$$

$$g(HSIZE, HSMOD) = 1 - \frac{V_{HSIZE} + V_{HEHT} \left(1 - \frac{V_{HSIZE}}{14.4V} \right)}{14.4V}$$

$$h(I_{HREF}) = 1 - \frac{I_{HREF}}{I_{HREFf} = 70kHz}$$

Two different modes of operation can be chosen for the EW output waveform via control bit FHMULT:

1. Mode 1

Horizontal size is controlled via register HSIZE and causes a DC shift at the EWDRV output. The complete waveform is also multiplied internally by a signal proportional to the line frequency [which is detected via the current at HREF (pin 28)]. This mode is to be used for driving EW diode modulator stage which require a voltage proportional to the line frequency.

2. Mode 2

The EW drive waveform does not track with the line frequency. This mode is to be used for driving EW modulators which require a voltage independent of the line frequency.

Output stage for asymmetric correction waveforms [ASCOR (pin 20)]

This output is designed as a voltage output for superimposed waveforms of vertical parabola and sawtooth. The amplitude and polarity of both signals can be change by registers HPARAL and HPINBAL via the I²C-bus.

Application hint: The TDA4856 offers two possibilities to control registers HPINBAL and HPARAL.

1. Control bit ACD = 1

The two registers now control the horizontal phase by means of internal modulation of the PLL2 horizontal phase control. The ASCOR output (pin 20) can be left unused, but it will always provide an output signal because the ASCOR output stage is not influenced by the control bit ACD.

2. Control bit ACD = 0

The internal modulation via PLL2 is disconnected. In order to obtain the required effect on the screen, pin ASCOR must now be fed to the DC amplifier which controls the DC shift of the horizontal deflection. This option is useful for applications which already use a DC shift transformer.

If the tube does not need HPINBAL and HPARAL, then pin ASCOR can be used for other purposes, i.e. for a simple dynamic convergence.

Dynamic focus section [FOCUS (pin 32)]

This section generates a complete drive signal for dynamic focus applications. The amplitude of the horizontal parabola is internally stabilized, thus it is independent of the horizontal frequency. The amplitude can be adjusted via register HFOCUS. Changing horizontal size may require a correction of HFOCUS. To compensate for the delay in external focus amplifiers a 'pre-correction' for the phase of the horizontal parabola has been implemented. The amount of this pre-correction can be adjusted via register HFOCAD. The amplitude of the vertical parabola is independent of frequency and tracks with all vertical adjustments. The amplitude can be adjusted via register VFOCUS.

FOCUS (pin 32) is designed as a voltage output for the superimposed vertical and horizontal parabolas.

B+ control function block

The B+ control function block of the TDA4856 consists of an Operational Transconductance Amplifier (OTA), a voltage comparator, a flip-flop and a discharge circuit. This configuration allows easy applications for different B+ control concepts. See also Application Note AN96052: "B+ converter Topologies for Horizontal Deflection and EHT with TDA4855/58".

GENERAL DESCRIPTION

The non-inverting input of the OTA is connected internally to a high precision reference voltage. The inverting input is connected to BIN (pin 5). An internal clamping circuit limits the maximum positive output voltage of OTA.

The output itself is connected to BOP (pin 3) and to the inverting input of the voltage comparator.

The non-inverting input of the voltage comparator can be accessed via BSENS (pin 4).

B+ drive pulses are generated by an internal flip-flop and fed to BDRV (pin 6) via an open-collector output stage.

This flip-flop is set at the rising edge of the signal at HDRV (pin 8). The falling edge of the output signal at BDRV has a defined delay of $t_{d(BDRV)}$ to the rising edge of the HDRV pulse. When the voltage at BSENS exceeds the voltage at BOP, the voltage comparator output resets the flip-flop and, therefore, the open-collector stage at BDRV is floating again.

An internal discharge circuit allows a well defined discharge of capacitors at BSENS. BDRV is active at a LOW-level output voltage (see Fig. 22), thus it requires an external inverting driver stage.

The B+ function block can be used for B+ deflection modulators in many different ways. Two popular application combinations are as follows:

- Boost converter in feedback mode (see Fig. 22)

In this application the OTA is used as an error amplifier with a limited output voltage range. The flip-flop is set on the rising edge of the signal at HDRV. A reset will be generated when the voltage at BSENS, taken from the current sense resistor, exceeds the voltage at BOP.

If no reset is generated within a line period, the rising edge of the next HDRV pulse forces the flip-flop to reset. The flip-flop is set immediately after the voltage at BSENS has dropped below the threshold voltage $V_{RESTART(BSENS)}$.

- Buck converter in feed forward mode

This application uses an external RC combination at BSENS to provide a pulse width which is independent from the horizontal frequency. The capacitor is charged via an external resistor and discharged by the internal discharge circuit. For normal operation the discharge circuit is activated when the flip-flop is reset by the internal voltage comparator. The capacitor will now be discharged with a constant current until the internally controlled stop level $V_{STOP(BSENS)}$ is reached. This level will be maintained until the rising edge of the next HDRV pulse sets the flip-flop again and disables the discharge circuit.

If no reset is generated within a line period, the rising edge of the next HDRV pulse automatically starts the discharge sequence and resets the flip-flop. When the voltage at BSENS reaches the threshold voltage $V_{RESTART(BSENS)}$, the discharge circuit will be disabled automatically and the flip-flop will be set immediately. This behaviour allows a definition of the maximum duty cycle of the B+ control drive pulse by the relationship of charge current to discharge current.

Supply voltage stabilizer, references, start-up procedures and protection functions

The TDA4857 provides an internal supply voltage stabilizer for excellent stabilization of all internal references. An internal gap reference, especially designed for low-noise, is the reference for the internal horizontal and vertical supply voltages. All internal reference currents and drive current for the vertical output stage are derived from this voltage via external resistors.

If either the supply voltage is below 8.3V or no data from the I²C-bus has been received after power-up, the internal soft start and protection functions do not allow any of those outputs [HDRV, BDRV, VOUT1, VOUT2 and HUNLOCK] to be active.

For supply voltages below 8.3V the internal I²C-bus will not generate an acknowledge and the IC is in standby mode. This is because the internal protection circuit has generated a reset signal for the soft start register SOFTST. Above 8.3V data is accepted and all registers can be loaded. If the register SOFTST has received a set from the I²C-bus, the internal soft start procedure is released, which activates all above mentioned outputs.

If during normal operation the supply voltage has dropped below 8.1 V, the protection mode is activated and HUNLOCK (pin 17) changes to the protection status and is floating. This can be detected by the microcontroller.

This protection mode has been implemented in order to protect the deflection stages and the picture tube during start-up, shut-down and fault conditions. This protection mode can be activated as shown in Table 3.

Table 3 Activation of protection mode

ACTIVATION	RESET
Low supply voltage at pin10	increase supply voltage; reload registers; soft start via I ² C-bus
Power dip, below 8.1 V	reload registers; soft start via I ² C-bus or via supply voltage
X-ray protection XRAY (pin 2) triggered	reload registers; soft start via I ² C-bus
HPLL2 (pin 30) externally pulled to ground	release pin 30

When the protection mode is active, several pins of the TDA4857 are forced into a defined state:

HDRV (horizontal driver output) is floating
 BDRV (B+ control driver output) is floating
 HUNLOCK (indicates, that the frequency-to-voltage converter is out of lock) is floating (HIGH-level via external pull-up resistor)
 CLBL provides a continuous blanking signal
 The capacitor at HPLL2 is discharged.

If the soft start procedure is activated via the I²C-bus, all of these actions will be performed in a well defined sequence.

Power dip recognition

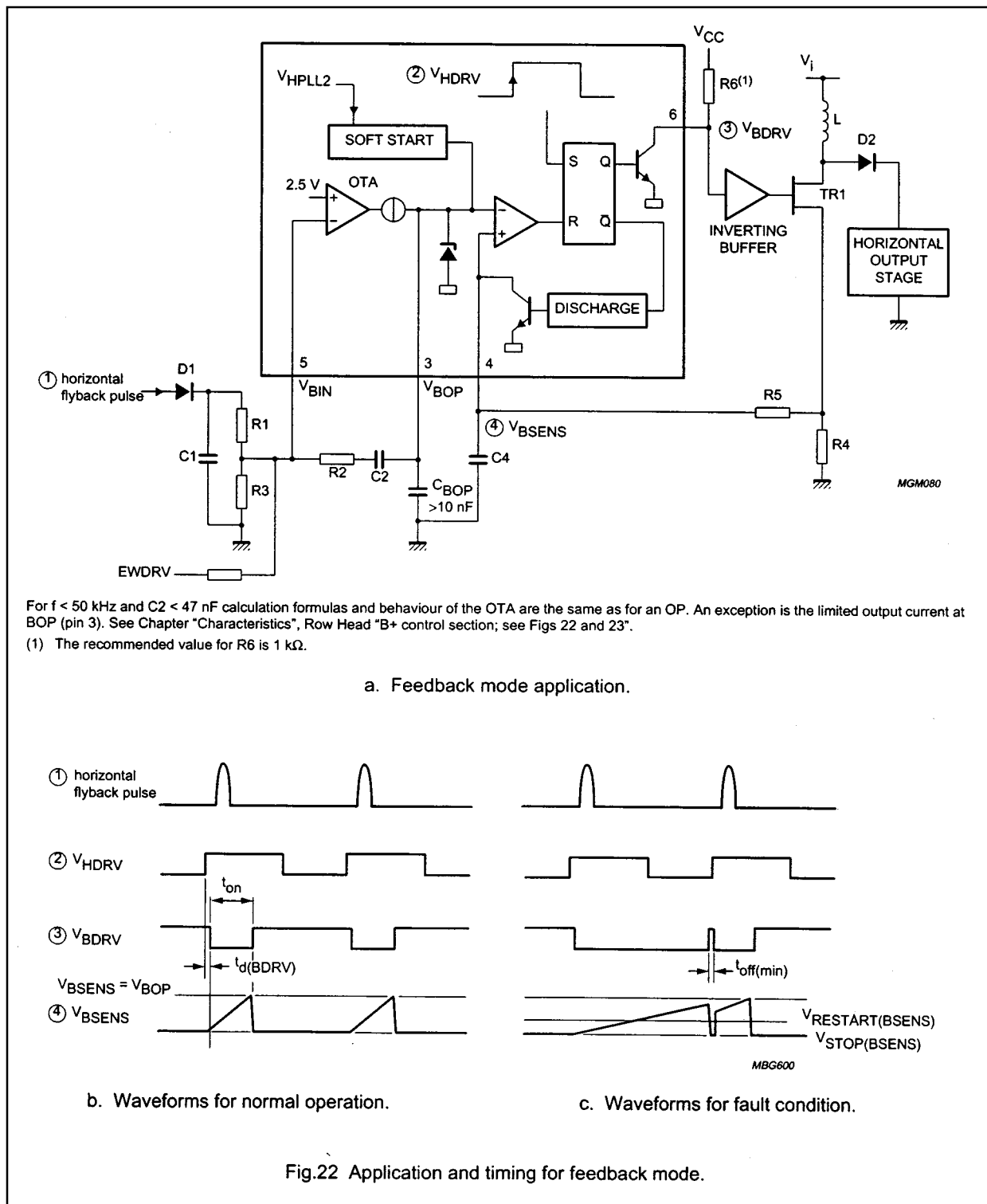
In standby mode the I²C-bus will only answer with an acknowledge, when data is sent to control register with subaddress 1AH. This register contains the standby and soft start control bit.

If the I²C-bus master transmits data to another register, an acknowledge is given after the chip address and the subaddress; an acknowledge is not given after the data. This indicates that only in soft start mode data can be stored into normal registers.

If the supply voltage dips under 8.1 V the TDA4857 leaves normal operation mode and changes into standby mode. The microcontroller can check this state by sending data into a register with the subaddress 0XH. The acknowledge will only be given on the data if the TDA4857 is active.

Due to this behavior the start-up of the TDA4857 is defined as follows. The first data that is transferred to the TDA4857 must be sent to the control register with subaddress 1AH. Any other subaddress will not lead to an acknowledge. This is a limitation in checking the I²C-busses of the monitor during start-up.

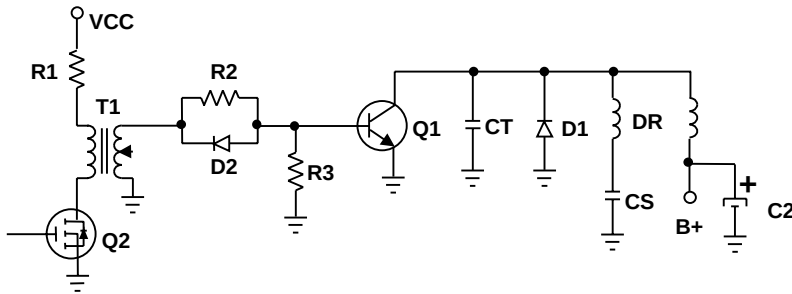
APPLICATION INFORMATION



4. Horizontal drive and power supply output

Circuit Diagram

Description of the circuit:



- 1) R1, T1 and Q2 compose the horizontal driving circuit, and the transistor Q1 generates a horizontal output through the driving signal.

$$I_{B1} = I_{CPMAX} / Q1h_{feMIN}$$

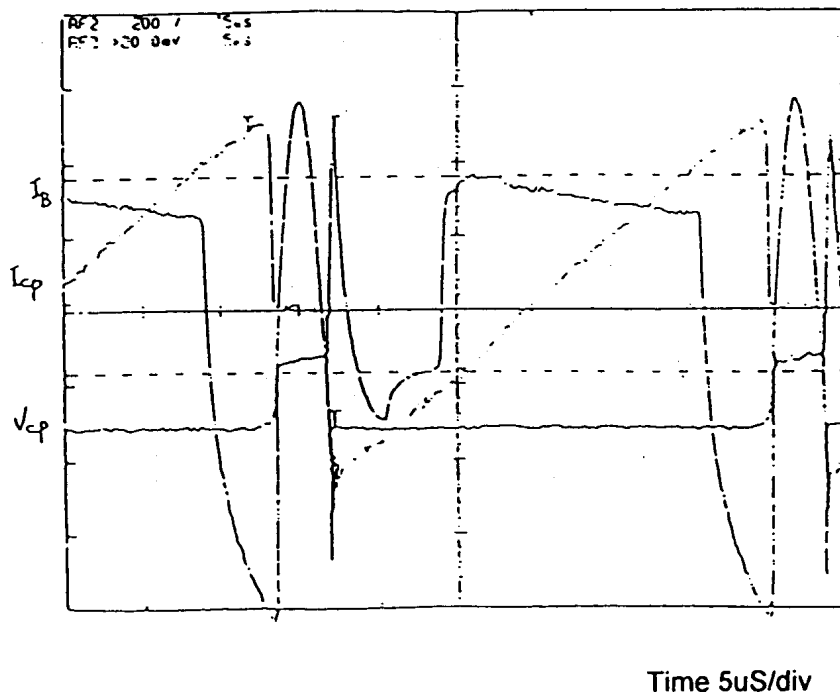
$$I_{B2} \approx 3I_{B1}$$

$$di/dt \approx 3.3 \text{ A/us}$$

- 2) The resistor R2 corrects the current I_{B1} , the resistor R3 works as a damping resistor and leak resistor, and the diode D2 works as a discharging device and polar body.

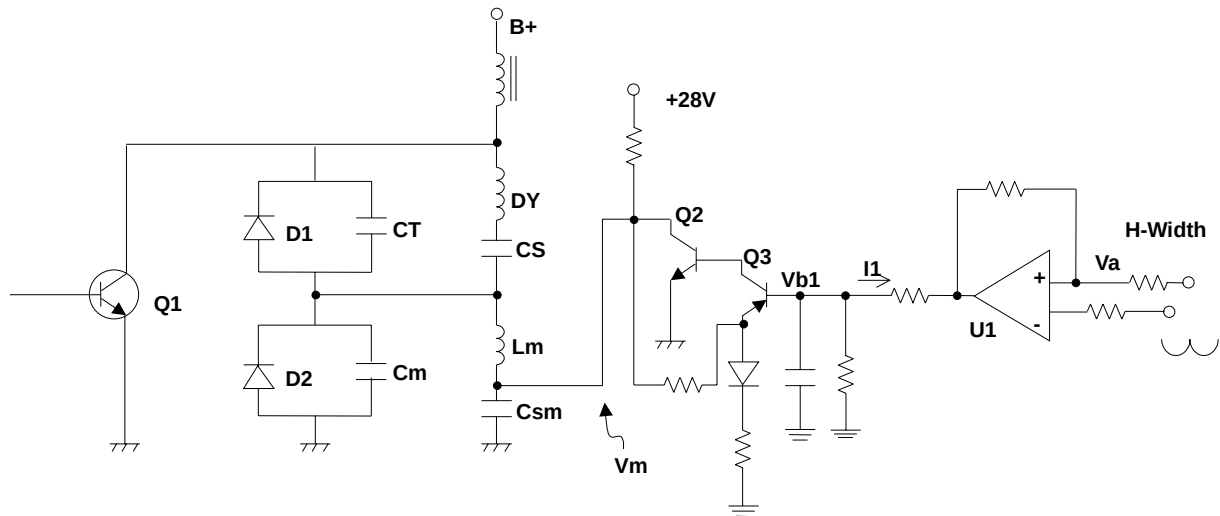
As long as the transistor Q1 is OFF, the discharge is accelerated and the storage time (T_{stg}) is shortened.

- 3) H-OUT circuit waveform



5. Horizontal amplitude control

Circuit Diagram



Description of the circuit:

- 1) The diodes D1 and D2 compose the bipolar modulation circuit, and have the function of controlling the currents of the coils DY (I_{pp}) and Lm (I_m) through voltage modulation carried out by utilizing VM.

$$B+ = V_m + V_{cs} \quad \text{Therefore, } V_{cs} = (I_y \cdot L_y) / t_s \rightarrow I_y = (V_{cs} \cdot t_s) / L_y, \text{ with } B+ \text{ fixed.}$$

Such being the case, the horizontal width decreases when $V_m \uparrow \rightarrow V_{cs} \downarrow \rightarrow I_y \downarrow$

Inversely, the horizontal width decreases when $V_m \downarrow \rightarrow V_{cs} \uparrow \rightarrow I_y \uparrow$

$$(B+ = (V_p \cdot 2T_r) / (\pi \cdot T_s), T_r = \frac{1}{\omega} L_y C_t, T_m = \frac{1}{\omega} L_m C_m)$$

- 2) Q2, Q3 and U1 compose the control circuit of H-WIDTH. Of those devices, the transistor Q2 and Q3 compose the Darlington current amplifier, and on the other operational amplifier U1 compose the emitter-coupled circuit, that stabilize the voltage and control the current.
- 3) The horizontal width broadens when $V_a \uparrow \rightarrow V_{b1} \downarrow \rightarrow I_1 \uparrow \rightarrow I_2 \uparrow \rightarrow V_m \downarrow \rightarrow$. An inference in the opposite sense is also possible.

Test points for maintenance:

- 1) $C_T = 31 \text{ to } 37 \text{ kHz} = 3.2 \text{ us}$
 $48 \text{ to } 64 \text{ kHz} = 3.0 \text{ us}$
 $C_m \div 2.8 \text{ us}$

- 2) $V_{A \text{ CENTER}}: 31 \text{ to } 64 \text{ kHz} \approx 1.91 \text{ to } 4.06 \text{ V}$
 $V_{M \text{ CENTER}}: 31 \text{ to } 64 \text{ kHz} \approx 11.6 \text{ to } 27.4 \text{ V}$

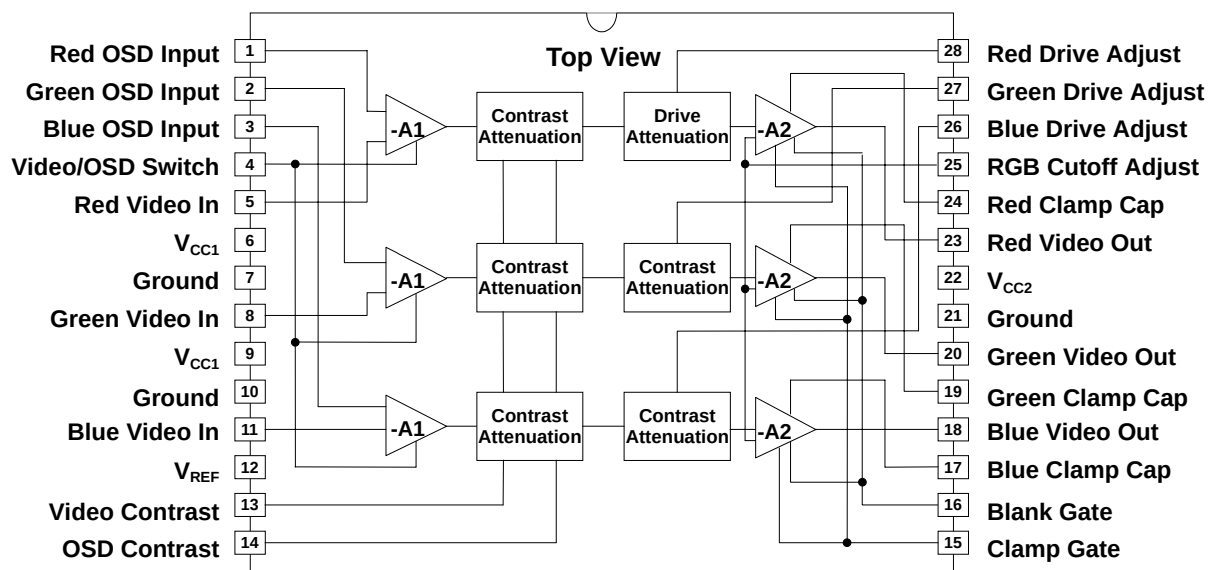
7. Video amplifier system with on-screen display

LM1281 (U201)

Outstanding features:

- * Three-channel video amplifier bandwidth 85 MHz @ -3 dB (4 Vp-p output)
- * OSD TTL input, bandwidth 50 MHz
- * High-speed video/OSD changeover
- * High impedance DC contrast control above the 0-4V, 40dB range
- * High impedance DC OSD contrast control above the 0-4V, 40dB range

BLOCK AND CONNECTION DIAGRAM



Description of the functions

Figure 1 shows the block diagram of LM1281, in conformity with the pin layout of the IC.

Every channel accepts both the video signal and the OSD signal at the input amplifier (A1).

Also the video/OSD changeover signal passes either the video signal or the OSD signal through LM1281, or is connected with the input amplifier for control purposes. The next contrast adjustment block is a drive adjustment type one.

The reference level for the DC return circuit is set by means of the RGB cutoff adjustment pin (PIN 25).

Attention must be paid to the fact that the blank clamp gate is active when it is stuck at the LOW state.

Under ordinary circumstances, these pins are controlled by means of the standard TTL signal.

Test Circuits

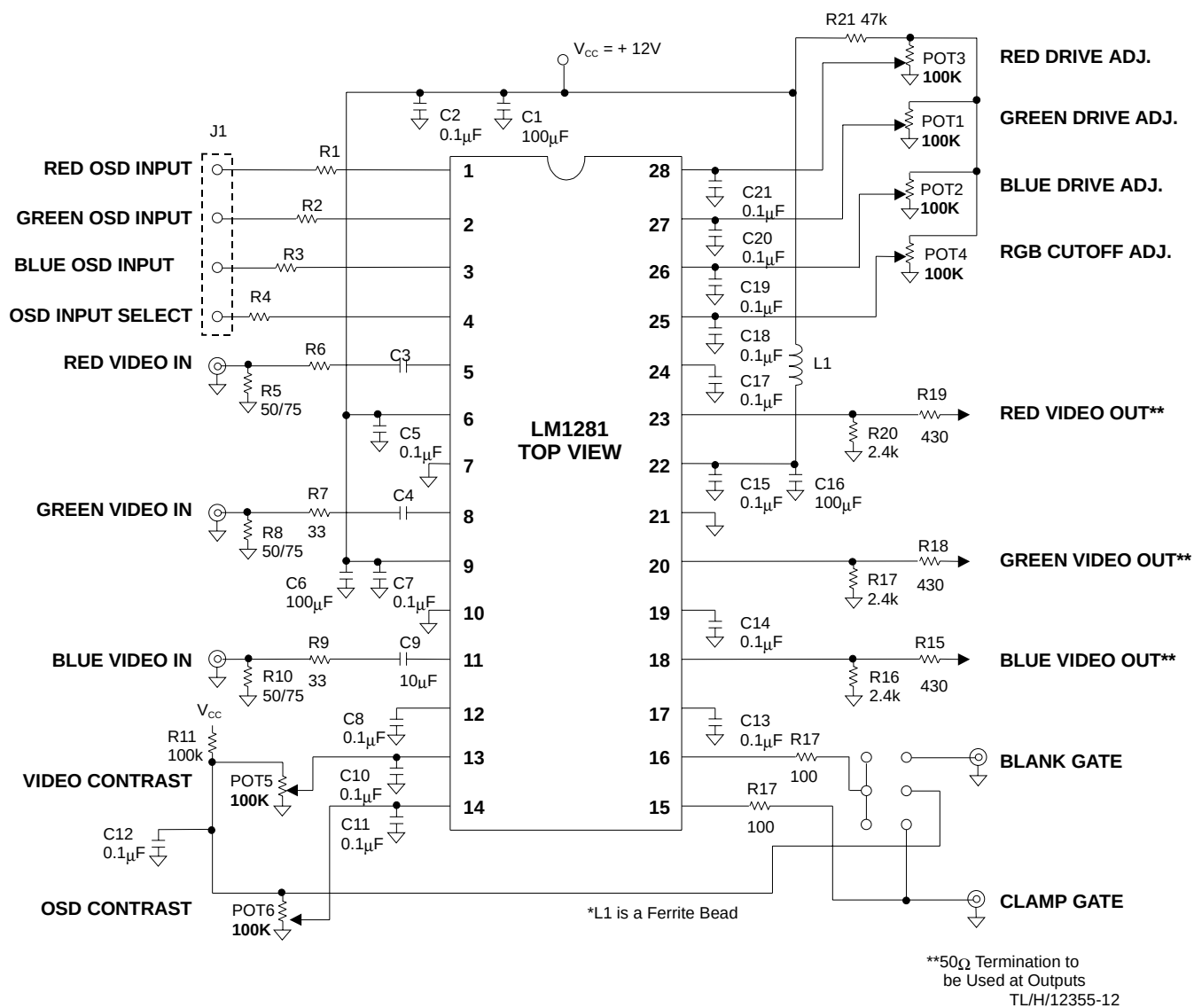


FIGURE 2 LM1281 OSD Video Preamp Demonstration Board Schematic



August 1999

LM2438

Monolithic Triple 13.5 ns CRT Driver

General Description

The LM2438 is an integrated high voltage CRT driver circuit designed for use in color monitor applications. The IC contains three high input impedance, wide band amplifiers which directly drive the RGB cathodes of a CRT. Each channel has its gain internally set to -14 and can drive CRT capacitive loads as well as resistive loads present in other applications, limited only by the package's power dissipation.

The IC is packaged in an industry standard 9-lead TO-220 molded plastic power package. See Thermal Considerations section.

Features

- Well matched with LM1279 video preamp
- 0V to 5V input range
- Stable with 0–20 pF capacitive loads and inductive peaking networks
- Convenient TO-220 staggered lead package style
- Standard LM243X Family Pinout which is designed for easy PCB layout

Applications

- 1024 x 768 displays up to 60 Hz refresh
- Pixel clock frequencies up to 60 MHz
- Monitors using video blanking

Schematic and Connection Diagrams

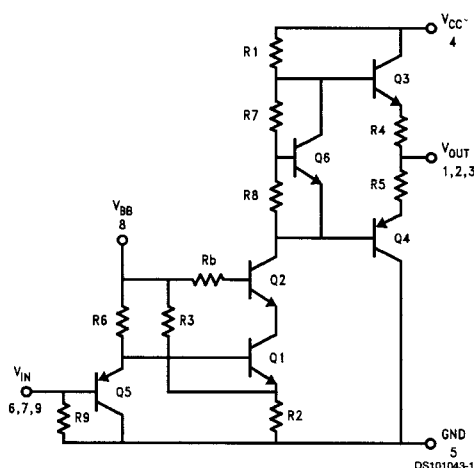
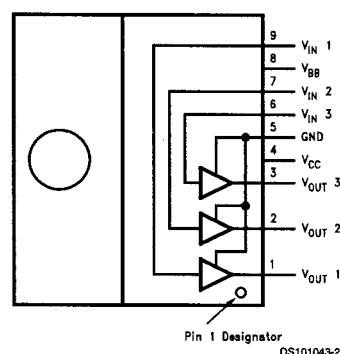


FIGURE 1. Simplified Schematic Diagram
(One Channel)



Note: Tab is at GND

Top View
Order Number LM2438T

LM2438 Monolithic Triple 13.5 ns CRT Driver

Theory of Operation

The LM2438 is a high voltage monolithic three channel CRT driver suitable for high resolution display applications. The LM2438 operates with 80V and 12V power supplies. The part is housed in the industry standard 9-lead TO-220 molded plastic power package.

The circuit diagram of the LM2438 is shown in *Figure 1*. The PNP emitter follower, Q5, provides input buffering. Q1 and Q2 form a fixed gain cascode amplifier with resistors R1 and R2 setting the gain at -14 . Emitter followers Q3 and Q4 isolate the high output impedance of the cascode stage from the capacitance of the CRT cathode which decreases the sensitivity of the device to load capacitance. Q6 provides biasing to the output emitter follower stage to reduce cross-over distortion at low signal levels.

Figure 2 shows a typical test circuit for evaluation of the LM2438. This circuit is designed to allow testing of the LM2438 in a 50Ω environment without the use of an expensive FET probe. In this test circuit, the two $2.49\text{ k}\Omega$ resistors form a 200:1 wideband, low capacitance probe when connected to a 50Ω coaxial cable and a 50Ω load (such as a 50Ω oscilloscope input). The input signal from the generator is ac coupled to the base of Q5.

Application Hints

INTRODUCTION

National Semiconductor (NSC) is committed to provide application information that assists our customers in obtaining the best performance possible from our products. The following information is provided in order to support this commitment. The reader should be aware that the optimization of performance was done using a specific printed circuit board designed at NSC. Variations in performance can be realized due to physical changes in the printed circuit board and the application. Therefore, the designer should know that component value changes may be required in order to optimize performance in a given application. The values shown in this document can be used as a starting point for evaluation purposes. When working with high bandwidth circuits, good layout practices are also critical to achieving maximum performance.

IMPORTANT INFORMATION

The LM2438 performance is targeted for the XGA (1024 x 768, 60 Hz refresh) resolution market. The application circuits shown in this document to optimize performance and to protect against damage from CRT arcover are designed specifically for the LM2438. If another member of the LM243X family is used, please refer to its datasheet.

POWER SUPPLY BYPASS

Since the LM2438 is a wide bandwidth amplifier, proper power supply bypassing is critical for optimum performance. Improper power supply bypassing can result in large overshoot, ringing or oscillation. $0.1\text{ }\mu\text{F}$ capacitors should be connected from the supply pins, V_{CC} and V_{BB} , to ground, as close to the LM2438 as is practical. Additionally, a $47\text{ }\mu\text{F}$ or larger electrolytic capacitor should be connected from both supply pins to ground reasonably close to the LM2438.

ARC PROTECTION

During normal CRT operation, internal arcing may occasionally occur. Spark gaps, in the range of 200V, connected from the CRT cathodes to CRT ground will limit the maximum volt-

age, but to a value that is much higher than allowable on the LM2438. This fast, high voltage, high energy pulse can damage the LM2438 output stage. The application circuit shown in *Figure 9* is designed to help clamp the voltage at the output of the LM2438 to a safe level. The clamp diodes, D1 and D2, should have a fast transient response, high peak current rating, low series impedance and low shunt capacitance. FDH400 or equivalent diodes are recommended. Do not use 1N4148 diodes for the clamp diodes. D1 and D2 should have short, low impedance connections to V_{CC} and ground respectively. The cathode of D1 should be located very close to a separately decoupled bypass capacitor (C3 in *Figure 9*). The ground connection of D2 and the decoupling capacitor should be very close to the LM2438 ground. This will significantly reduce the high frequency voltage transients that the LM2438 would be subjected to during an arcover condition. Resistor R2 limits the arcover current that is seen by the diodes while R1 limits the current into the LM2438 as well as the voltage stress at the outputs of the device. R2 should be a $\frac{1}{2}\text{W}$ solid carbon type resistor. R1 can be a $\frac{1}{4}\text{W}$ metal or carbon film type resistor. Having large value resistors for R1 and R2 would be desirable, but this has the effect of increasing rise and fall times. Inductor L1 is critical to reduce the initial high frequency voltage levels that the LM2438 would be subjected to. The inductor will not only help protect the device but it will also help minimize rise and fall times as well as minimize EMI. For proper arc protection, it is important to not omit any of the components shown in *Figure 9*.

Application Hints (Continued)

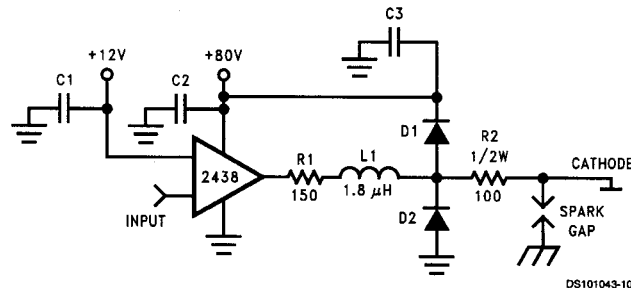


FIGURE 9. One Channel of the LM2438 with the Recommended Application Circuit

OPTIMIZING TRANSIENT RESPONSE

Referring to Figure 9, there are three components (R1, R2 and L1) that can be adjusted to optimize the transient response of the application circuit. Increasing the values of R1 and R2 will slow the circuit down while decreasing overshoot. Increasing the value of L1 will speed up the circuit as well as increase overshoot. It is very important to use inductors with very high self-resonant frequencies, preferably above 300 MHz. Ferrite core inductors from J.W. Miller Magnetics (part #78F1R8K) were used for optimizing the performance of the device in the NSC application board. The values shown in Figure 9 can be used as a good starting point for the evaluation of the LM2438. Using a variable resistor for R1 will simplify finding the value needed for optimum performance in a given application. Once the optimum value is determined the variable resistor can be replaced with a fixed value.

EFFECT OF LOAD CAPACITANCE

Figure 8 shows the effect of increased load capacitance on the speed of the device. This demonstrates the importance of knowing the load capacitance in the application. Figure 8 also shows the effect inductance has on the rise and fall times.

EFFECT OF OFFSET

Figure 7 shows the variation in rise and fall times when the output offset of the device is varied from 40 to 50 V_{DC}. The rise time shows a maximum variation relative to the center data point (45 V_{DC}) of about 2%. The fall time shows a variation of about 2% relative to the center data point.

THERMAL CONSIDERATIONS

Figure 4 shows the performance of the LM2438 in the test circuit shown in Figure 2 as a function of case temperature. The figure shows that the rise time of the LM2438 increases by approximately 5% as the case temperature increases from 50°C to 100°C. This corresponds to a speed degradation of 1% for every 10°C rise in case temperature. The fall time increases by approximately 7.5% as the case temperature increases from 50°C to 100°C. This corresponds to a speed degradation of 1.5% for every 10°C rise in case temperature.

Figure 6 shows the maximum power dissipation of the LM2438 vs. Frequency when all three channels of the device are driving an 8 pF load with a 40 V_{p-p} alternating one pixel on, one pixel off signal. The graph assumes a 72% active time (device operating at the specified frequency) which is typical in a monitor application. The other 28% of the time

the device is assumed to be sitting at the black level (65V in this case). This graph gives the designer the information needed to determine the heat sink requirement for his application. The designer should note that if the load capacitance is increased the AC component of the total power dissipation will also increase.

The LM2438 case temperature must be maintained below 100°C. If the maximum expected ambient temperature is 70°C and the maximum power dissipation is 2.6W (from Figure 6, 30 MHz bandwidth) then a maximum heat sink thermal resistance can be calculated:

$$R_{TH} = \frac{100^{\circ}\text{C} - 70^{\circ}\text{C}}{2.6\text{W}} = 11.5^{\circ}\text{C/W}$$

This example assumes a capacitive load of 8 pF and no resistive load.

TYPICAL APPLICATION

A typical application of the LM2438 is shown in Figure 11. Used in conjunction with an LM1279, a complete video channel from monitor input to CRT cathode can be achieved. Performance is ideal for 1024 x 768 resolution displays with pixel clock frequencies up to 60 MHz. Figure 11 is the schematic for the NSC demonstration board that can be used to evaluate the LM1279/2438 combination in a monitor.

PC BOARD LAYOUT CONSIDERATIONS

For optimum performance, an adequate ground plane, isolation between channels, good supply bypassing and minimizing unwanted feedback are necessary. Also, the length of the signal traces from the preamplifier to the LM2438 and from the LM2438 to the CRT cathode should be as short as possible. The following references are recommended:

Ott, Henry W., "Noise Reduction Techniques in Electronic Systems", John Wiley & Sons, New York, 1976.

"Video Amplifier Design for Computer Monitors", National Semiconductor Application Note 1013.

Pease, Robert A., "Troubleshooting Analog Circuits", Butterworth-Heinemann, 1991.

Because of its high small signal bandwidth, the part may oscillate in a monitor if feedback occurs around the video channel through the chassis wiring. To prevent this, leads to the video amplifier input circuit should be shielded, and input circuit wiring should be spaced as far as possible from output circuit wiring.

Application Hints (Continued)

NSC DEMONSTRATION BOARD

Figure 12 shows the routing and component placement on the NSC LM1279/2438 demonstration board. The schematic of the board is shown in Figure 11. This board provides a good example of a layout that can be used as a guide for future layouts. Note the location of the following components:

- C54, C56 — V_{CC} bypass capacitor, located very close to pin 4 and ground pins
- C43, C44 — V_{BB} bypass capacitors, located close to pin 8 and ground
- C53, C55 — Additional V_{CC} bypass capacitors, near LM2438 and V_{CC} clamp diodes. Very important for arc protection.

The routing of the LM2438 outputs to the CRT is very critical to achieving optimum performance. Figure 13 shows the routing and component placement from pin 1 of the LM2438

to the red cathode. Note that the components are placed so that they almost line up from the output pin of the LM2438 to the red cathode pin of the CRT connector. This is done to minimize the length of the video path between these two components. Note also that D16, D17, R21 and D9 are placed to minimize the size of the video nodes that they are attached to. This minimizes parasitic capacitance in the video path and also enhances the effectiveness of the protection diodes. The anode of protection diode D17 is connected directly to a section of the ground plane that has a short and direct path to the LM2438 ground pins. The cathode of D16 is connected to V_{CC} very close to decoupling capacitor C53 (see Figure 13) which is connected to the same section of the ground plane as D17. The diode placement and routing is very important for minimizing the voltage stress on the LM2438 during an arcover event. Lastly, notice that S1 is placed very close to the red cathode and is tied directly to CRT ground.

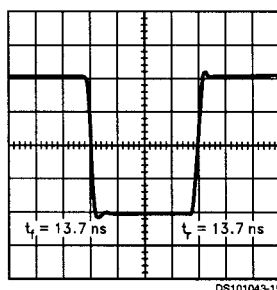


FIGURE 10. Waveform at Cathode with LM1279/243X Demo Board

9. On Screen Display

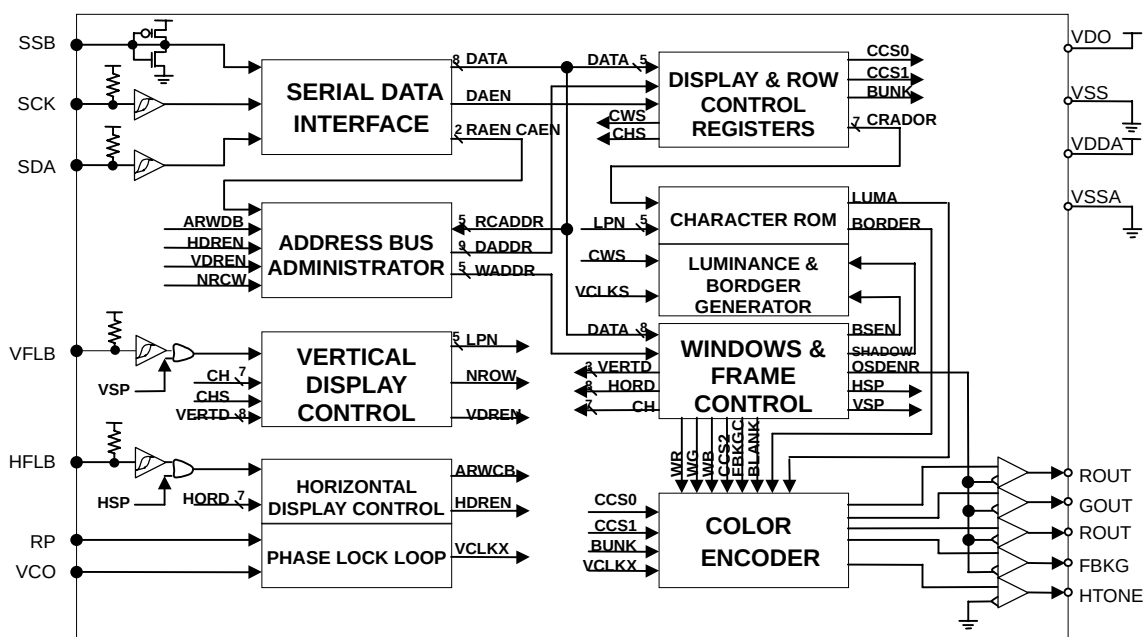
FEATURES

- Horizontal sync input may be up to 100 kHz.
- On-chip PLL circuitry up to 90MHz pixel rate for multi-sync operation.
- Programmable horizontal resolutions up to 1524 dots per display row.
- 538 bytes display registers to control full screen display.
- Full screen display consists of 10 (rows) by 24 (columns) characters.
- 12 × 18 dot matrix per character.
- 128 built-in characters and graphic symbols and character by character color selection.
- Maximum 8 color selectable per display row.
- Double character height and/or width control.
- Programmable positioning for display screen center.
- Bordering and shadowing effect for display.
- Programmable vertical character height (18 to 71 lines) for multi-sync operation.
- 4 programmable background windows with multi-level windowing effect.
- Software clear function for display frame buffer.
- Hsync and Vsync input polarity selectable.
- Auto detection for input edge distortion between Hsync and Vsync inputs.
- Half tone and fast blanking output.
- Software force blank function for display frame.
- Compatible with both SPI bus and I²C interface through pin selection.
- 16 pins PDIP package.

GENERAL DESCRIPTION

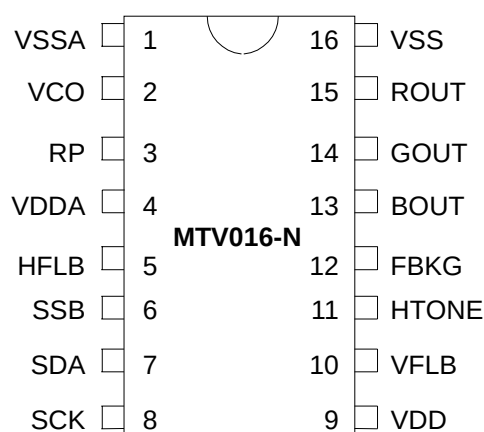
MTV016 is designed for use in monitor applications to display the built-in characters or symbols onto monitor screen. The display operation is by transferring data and control information in micro controller to RAM through a serial data interface. It can execute full screen display automatically and specific functions such as character bordering, shadowing, double height and width, font by font color control, frame positioning, frame size control by character height and horizontal display resolution, and windowing effect.

BLOCK DIAGRAM



1.0 CONNECTION DIAGRAM

(16 PINS PDIP 300 MIL PACKAGE)



2.0 PIN DESCRIPTIONS

Name	I/O	Pin#	Function
VSSA	-	1	Analog ground. This ground pin is used to internal analog circuitry.
VCO	I/O	2	Voltage Control Oscillator. This pin is used to control the internal oscillator frequency by DC voltage input from external low pass filter.
RP	I/O	3	Bias Resistor. The bias resistor is used to regulate the appropriate bias current for internal oscillator to resonate at specific dot frequency.
VDDA	-	4	Analog power supply. Positive 5 V DC supply for internal analog circuitry. And a 0.1uF decoupling capacitor should be connected across to VDDA and VSSA.
HFLB	I	5	Horizontal input. This pin is used to input the horizontal synchronizing signal. It has an internal 100 k Ω pull-up resistor.
SSB	I	6	Serial interface enable. It is used to enable the serial data interface and is also used to select I ² C or SPI bus operation. If this pin is left floating, I ² C bus is enable. Otherwise the SPI bus is enabled.
SDA	I	7	Serial data input. The external data transfer through this pin to internal display registers and control registers. It has an internal 100 k Ω pull-up resistor.
SCK	I	8	Serial clock input. The clock input pin is used to synchronize the data transfer. It has an internal 100 k Ω pull-up resistor.
VDD	-	9	Digital power supply. Positive 5 V DC supply for internal digital circuitry and a 0.1uF decoupling capacitor should be connected across to VDD and VSS.
VFLB	I	10	Vertical input. This pin is used to input the vertical synchronizing signal. It has an internal pull-up resistor.
HTONE	O	11	Half tone output. This pin is used to attenuate the external R, G, B amplifiers gain for the transparent windowing effect.
FBKG	O	12	Fast Blanking output. It is used to cut off the external R, G, B signals while this chip is displaying characters or windows.
BOUT	O	13	Blue color output. It is a blue color video signal output.
GOUT	O	14	Green color output. It is a green color video signal output.
ROUT	O	15	Red color output. It is a red color video signal output.
VSS	-	16	Digital ground. This ground pin of internal digital circuitry.

Replacement Parts List

1) MultiSync 75F-3

The components specified for Model MS75F-3 Orion CRT.

Note: The components identified by  make are critical for safety.

Replace only with parts Number specified.

SYMBOL	PART NO	DESCRIPTION
*** CRT & TUNER ***	***	***
CRT	80013331	CRT 17" ORION M41QEC200X021
*** ICS ***	***	***
U702	80009941	ATMEL E ² ROM AT24C08B
U101	DD002600	IC LINEAR KA3842A 8P
U201	80000631	IC LM1281
U103	80000321	IC PHOTO COUPLE PS2561.TLP721F
O103	80003831	IC REGULATOR TL431 817B 4P
U401	80001041	IC TDA8172 (N.S.SGS)
U203	80003661	N.S VIDEO DRIVE IC LM2438
U701	80013001	N0701-2 VE MASK MCU
U301	80010251	OP AMP LM358 / KIA358
U204	80015661	OSD IC MTV016N (V2)
U302	80012941	PHILIPS IC TDA 4857
*** TRANSISTOR ***	***	***
O101	EF202500	FET N 2SK2545 TO-220F TOSHIBA
O313	EF206301	FET N YTAf630 TO-220F
O308	EFA29610	TR 2SK2961 FET TOSHIBA
Q201	EAA12133	TR NPN 2SC1213AC TO-92(T)
O105	O107	O110
O113	O302	O306
O320	O323	O324
O401	O601	O603
O605	O606	
O303	EAA40020	TR NPN 2SC4002 TO-92(T) (SANYO)
O307	80005721	TR NPN 2SC5411(hfe) TO-3P
O321	EAA09456	TR NPN 2SC945P TO-92(T) (N.P.S.)
O318	80008141	TR NPN 2SD1763 TO-220F
O304	EAA04220	TR NPN BF422 TO-92(T) (T.P)
O106	EAA23281	TR NPN KSC 2328A TO-92(T) (SAMSUNG)
O301	EAA23690	TR NPN PH2369 TO-92(T) (PHILIPS)
O310	O604	TR PNP 2SA1015GR TO-92(T) (T.P.S.)
O325	O326	O701
O702	O703	
O112	EBA04230	TR PNP BF423 TO-92(T)(T.P.)
O305	EBA04230	TR PNP BF423 TO-92(T)(T.P.)
O108	O317	EBA09281
O104	EB307720	TR PNP KSA 928A TO-92(T)(SAMSUNG)
		TR PNP KSB772 TO-126

SYMBOL	PART NO	DESCRIPTION
*** TRANSFORMERS ***	***	***
T301	80009281	17" N0701F FBT
T302	80000281	H.DRIVE X'FM 4.5mH EI-19
T303	80013361	N1701F D.F X'FM EI-19(1:9)
T101	80011211	POWER X'FM ERL35 500uH FE700+
*** VARIABLE RESISTORS ***	***	***
VR101	FF300201	VR CARBON 6mm 200 ohm/B
VR210	FF300203	VR CARBON 6mm 20K/B
VR307	FF310104	VR CARBON 6mm 100K
*** RELAYS & SWITCHES ***	***	***
RL101	80003751	RELAY 12V 6P GSA-SS-212DM(GOOD-SKY)
RL301	80010001	RELAY RUDH-SH-112D 400ohm (GOOD SKY)
SW101	80012411	SW POWER 30V/0.3A
SW701	80000251	JPS1258DS(Favortron)
SW301	80010621	TACT SW 1P 100G+50
		WAFER 2Lx3P 2.54mm
*** COILS & FILTERS ***	***	***
L201	HB000008	CHOKE COIL 100uH 8X10
L303	80015701	CHOKE COIL 120uH 18X20 + BASE
L304	80001811	CHOKE COIL 130uH 18X20 + BASE
L103	80003681	CHOKE T50-26B 200uH
G2.G4 WIRF	HA030010	EMI FILTER COIL 20.45X10.2X10
L301	80009291	H-CENTER CHOKE
L101	80000111	LINE FILTER ET24 10mH MIN
L102	HB000015	LINE FILTER UU10.5 1mH
L302	80005311	LINEARITY CHOKE 30uH
L307	80015691	N1701F LINEARITY COIL FOR ORION
L203	L204	L205
J23	HB013159	PACKING COIL /T 1.5uH K(EC24)
	HB013100	PACKING COIL /T 10uH K(EC24)
*** PWB ASSYS ***	***	***
	7C0215M0	CRT BOARD ASSY
	7M0215M0	MAIN BOARD ASSY
*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***	***	***
SOCKET	80001751	17" 29D NECK CRT SOCKET
P101	JD512001	AC SOCKET 3P
F101	80001521	FUSE 3.15A/250V 50T T3.15A
FOR U701	JD010040	IC SOCKET 40P
DEGAUSSING COIL	80015641	MS75F-3 TCO DEGAUSSING
POWER CORD	80001651	POWER CORD 3P 1.8M EUROPE
CABLE	80012051	SIGNAL CABLE 20276 1.5M FOR PC+5V
TH101	80000801	THERMISTOR NTCR SCK054 13.3mm
TH102	80005821	THERMISTOR PTCR 4.5ohm
X701	EM012004	X'TAL 49U 12MHz

SYMBOL	PART NO	DESCRIPTION
*** DIODES ***	***	***
D107	D109	D10A
D117	D119	D125
D126	D127	D129
D202	D203	D204
D205	D210	D211
D230	D231	D250
D251	D302	D304
D311	D313	D314
D315	D317	D319
D320	D323	D325
D327	D332	D333
D334	D336	D337
D340	D344	D601
D602	D604	D605
D60A	D703	D704
D705		
D112	D113	D118
D110	D335	
D308		
D305	D306	D702
D101	D102	D103
D104		
D111		
D307		
D316		
D213	D214	D233
D234	D253	D254
D106	D108	D131
D303	D310	D345
D701		
D201	D301	D312
D318	D321	D322
D324	D328	D329
D330	D331	D341
D403		
D105	D116	D326
LED701		
ZD104		
ZD101		
ZD102		
ZD303	ZD701	ZD702
ZD703	ZD704	
ZD706		
EJ044148		DIODE "T" 1N4148
EJ820001		DIODE/A 3A 1N5406
80011291		DIODE/A 3A/400V RG4()
80001171		DIODE/A 5TUZ47C (TOSHIBA)
80008261		DIODE/A RP3F(A+K) SANKEN
80000451		DIODE/T 1/2W 1SS83
FJAC0017		DIODE/T 1A 1N4936
EJAC0018		DIODE/T 1A 1N4937
EJA20003		DIODE/T 1A BA159
80000131		LED L-59GH/1GYC
EKA00603		ZEN DIODE 1/2W(T) 6B1 (HITACHI)
EKA01808		ZEN DIODE 1/2W(T) HZS 18-2 (HITACHI)
EKA01201		ZEN DIODE 1/2W(T) HZS12A2 (HITACHI)
EKA00507		ZEN DIODE 1/2W(T) HZS5C2 (HITACHI)
EKA00607		ZEN DIODE 1/2W(T) HZS6C2 (HITACHI)

SYMBOL	PART NO	DESCRIPTION
*** APPEARANCE PARTS ***	***	***
	10100924	CABINET BACK(PC+ABS)
	10101482	CABINET FRONT ASSY(PC+ABS)
	10101491	CABINET FRONT(PC+ABS)
	17000301	CUSHION PIECE(BACK)
	17000291	CUSHION SHEET
	17000451	CUSHION SHEET
	11000331	REVOLVING STAND ASSY
	11000251	REVOLVING STAND(B)(94HB)
	11000361	REVOLVING STAND(B)(94HB)
	11000261	REVOLVING STAND(T)(94HB)
*** PRINTED & PACKING MATERIALS ***	***	***
	13201142	CARTON BOX MS75F-1(B Ver.)
	19700025	INSTRUCTION CD-ROM MS75/95F-1
	15000962	NAME PLATE INSTRUCTION MS75F-1(B Ver.)
	15500724	OWNERS MANUAL MS75F/95F-1(B Ver.)
	13400521	POLYLON(B)CARTON
	13400511	POLYLON(T)CARTON
*** RESISTORS ***	***	***
R156	FA330159	CARBON 1/2W(T) 5% 1.5ohm
R325	FA330182	CARBON 1/2W(T) 5% 1.8Kohm
R114	FA330104	CARBON 1/2W(T) 5% 100Kohm
R287	FA330101	CARBON 1/2W(T) 5% 100ohm
R365	FA330154	CARBON 1/2W(T) 5% 150Kohm
R385	FA330150	CARBON 1/2W(T) 5% 15ohm
R182	FA330102	CARBON 1/2W(T) 5% 1Kohm
R367	FA330105	CARBON 1/2W(T) 5% 1Mohm
R417	FA330229	CARBON 1/2W(T) 5% 2.2ohm
R414	FA330331	CARBON 1/2W(T) 5% 330ohm
R30L	FA330470	CARBON 1/2W(T) 5% 47ohm
R308	FA330561	CARBON 1/2W(T) 5% 560ohm
R101	FA330684	CARBON 1/2W(T) 5% 680Kohm
R292	FA240101	CARBON 1/4W(T) 5% 100ohm
R206	FA240103	CARBON 1/4W(T) 5% 10Kohm
R10A	FA240113	CARBON 1/4W(T) 5% 11Kohm
R392	FA240154	CARBON 1/4W(T) 5% 150Kohm
R220	FA240151	CARBON 1/4W(T) 5% 150ohm
R163	FA240102	CARBON 1/4W(T) 5% 1Kohm
R609	FA240222	CARBON 1/4W(T) 5% 2.2Kohm
R118	FA240203	CARBON 1/4W(T) 5% 20Kohm
R393	FA240224	CARBON 1/4W(T) 5% 220Kohm

SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION
R278	R280	R290	FA240223	CARBON 1/4W(T) 5% 22Kohm	R386			FA040623	CARBON 1/8W(T) 5% 62Kohm
R30X					R319			FA040683	CARBON 1/8W(T) 5% 68Kohm
R116			FA240271	CARBON 1/4W(T) 5% 270ohm	R201			FA040680	CARBON 1/8W(T) 5% 68ohm
R30T			FA240332	CARBON 1/4W(T) 5% 3.3Kohm	R113	R382		FA040752	CARBON 1/8W(T) 5% 7.5Kohm
R104			FA240330	CARBON 1/4W(T) 5% 33 ohm	R212	R232	R252	FA040750	CARBON 1/8W(T) 5% 75ohm
R108	R286		FA240334	CARBON 1/4W(T) 5% 330Kohm	R336			FA040822	CARBON 1/8W(T) 5% 8.2Kohm
R117			FA240390	CARBON 1/4W(T) 5% 39ohm	R284			FA040821	CARBON 1/8W(T) 5% 820ohm
R343	R350		FA240472	CARBON 1/4W(T) 5% 4.7Kohm	R150	R157	R175	80002031	FUSEABLE RES 1/2W(A)M 0.22ohm
R30H	R30J		FA240474	CARBON 1/4W(T) 5% 470Kohm	R297			FB910229	FUSIBLE MF RES 1/4W 2.2ohm J
R107			FA240564	CARBON 1/4W(T) 5% 560Kohm	R31Q			FB241181	METAL 1/4W(T) 1% 1.18Kohm
R126			FA240681	CARBON 1/4W(T) 5% 680ohm	R31U			FB241202	METAL 1/4W(T) 1% 12Kohm
R322			FA040122	CARBON 1/8W(T) 5% 1.2Kohm	R389			FB241372	METAL 1/4W(T) 1% 13.7Kohm
R387			FA040132	CARBON 1/8W(T) 5% 1.3Kohm	R366			FB241503	METAL 1/4W(T) 1% 150Kohm
R205	R338	R708	FA040152	CARBON 1/8W(T) 5% 1.5Kohm	R149			FB241001	METAL 1/4W(T) 1% 1Kohm
R714					R410	R412		FB242501	METAL 1/4W(T) 1% 2.5Kohm
R703			FA040182	CARBON 1/8W(T) 5% 1.8Kohm	R31R			FB242701	METAL 1/4W(T) 1% 2.7Kohm
R155	R168	R31C	FA040104	CARBON 1/8W(T) 5% 100Kohm	R361			FB242002	METAL 1/4W(T) 1% 20Kohm
R327	R340	R373			R31N			FB242202	METAL 1/4W(T) 1% 22Kohm
R375					R344			FB242552	METAL 1/4W(T) 1% 25.5Kohm
R202	R203	R208	FA040101	CARBON 1/8W(T) 5% 100ohm	R711			FB243481	METAL 1/4W(T) 1% 3.48Kohm
R209	R221	R241			R31L			FB244532	METAL 1/4W(T) 1% 45.3Kohm
R261	R306	R30N			J26			FB244702	METAL 1/4W(T) 1% 47Kohm
R30Y	R31X	R331			R158			FB240470	METAL 1/4W(T) 1% 47ohm
R332	R706	R707			R348			FB245541	METAL 1/4W(T) 1% 5.54Kohm
R724	R727	R742			R388			FB245490	METAL 1/4W(T) 1% 549ohm
R743	R761	R762			R349			FB245602	METAL 1/4W(T) 1% 56Kohm
R110	R122	R161	FA040103	CARBON 1/8W(T) 5% 10Kohm	R151			FB246242	METAL 1/4W(T) 1% 62.4Kohm
R167	R288	R293			R210	R230	R250	FB247509	METAL 1/4W(T) 1% 75ohm
R307	R30M	R30Q			R411	R413		FB248201	METAL 1/4W(T) 1% 8.2Kohm
R310	R318	R330			R31T			FB249312	METAL 1/4W(T) 1% 93.1Kohm
R345	R360	R368			R169	R313	R314	FB910010	METAL 1/4W(T) 5% 1ohm
R369	R377	R379			R351				
R601	R604	R612			R415			FB470119	MOF 1W/M(A) 5% 1.1ohm
R613	R709	R720			R128	R606		FB470100	MOF 1W/M(A) 5% 10ohm
R736			FA040106	CARBON 1/8W(T) 5% 10Mohm	R160			FB470153	MOF 1W/M(A) 5% 15Kohm
R317					R421			FB470109	MOF 1W/M(A) 5% 1ohm
R353			FA040154	CARBON 1/8W(T) 5% 150Kohm	R312			FB470270	MOF 1W/M(A) 5% 27ohm
R154	R357		FA040153	CARBON 1/8W(T) 5% 15Kohm	R422			FB470339	MOF 1W/M(A) 5% 3.3ohm
R362			FA040150	CARBON 1/8W(T) 5% 15ohm					
R112	R123	R132	FA040102	CARBON 1/8W(T) 5% 1Kohm					
R289	R301	R401							
R603									

SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION
R159	R296	R315	FA040105	CARBON 1/8W(T) 5% 1Mohm	R103			FB470680	MOF 1W/M(A) 5% 68ohm
R395					R31A			FB480100	MOF 1W/M(B) 5% 10ohm
R608			FA040222	CARBON 1/8W(T) 5% 2.2Kohm	R105			FB560248	MOF 2W/M(A) 5% 0.24ohm
R305			FA040225	CARBON 1/8W(T) 5% 2.2Mohm	R354			FB560182	MOF 2W/M(A) 5% 1.8Kohm
R374			FA040204	CARBON 1/8W(T) 5% 200Kohm	R125			FB560103	MOF 2W/M(A) 5% 10Kohm
R223	R243	R263	FA040224	CARBON 1/8W(T) 5% 220Kohm	R335			FB560151	MOF 2W/M(A) 5% 150ohm
R30C	R30E	R339			R302			FB560222	MOF 2W/M(A) 5% 2.2Kohm
R270			FA040221	CARBON 1/8W(T) 5% 220ohm	R316			FB560331	MOF 2W/M(A) 5% 330ohm
R127	R130	R611	FA040223	CARBON 1/8W(T) 5% 22Kohm	R106			FB570563	MOF 2W/M(B) 5% 56Kohm
R726					R309			FB710150	MOF 3W/M(A) 5% 15ohm
R30G			FA040220	CARBON 1/8W(T) 5% 22ohm	R311			FB710109	MOF 3W/M(A) 5% 1ohm
R363			FA040244	CARBON 1/8W(T) 5% 240Kohm	R304			80011181	RESISTOR FUSEABLE 1/2W(A)M 22ohm
R364			FA040274	CARBON 1/8W(T) 5% 270Kohm	R394			FC030508	WOUND RES 1W(A) 5% 0.5ohm
R244	R264		FA040202	CARBON 1/8W(T) 5% 2Kohm	R111			FC110158	WOUND RES 2W(A) 5% 0.15ohm
R31P	R731		FA040332	CARBON 1/8W(T) 5% 3.3Kohm	*** CAPACITORS ***				
R358			FA040334	CARBON 1/8W(T) 5% 330Kohm	C707	C708		GB610152	CERAMIC SL/T 100P/50V J
R102	R31H	R31J	FA040331	CARBON 1/8W(T) 5% 330ohm	C353			GB633152	CERAMIC SL/T 330P/50V J
R715	R721				C705	C706		GB633052	CERAMIC SL/T 33P/50V J
R219	R239	R259	FA040333	CARBON 1/8W(T) 5% 33Kohm	SG301			80011281	CERAMIC SPARK CAPS 1KV +1500V-900V
R328					C276	C357		GB7102H3	CERAMIC Y5P(B)/T 1000P/1KV K
R211	R231	R251	FA040330	CARBON 1/8W(T) 5% 33ohm	C275	C278	C287	GB7102F3	CERAMIC Y5P(B)/T 1000P/500V K
R213	R233	R253	FA040391	CARBON 1/8W(T) 5% 390ohm	C297				
R713			FA040393	CARBON 1/8W(T) 5% 39Kohm	C605			GB710253	CERAMIC Y5P(B)/T 1000P/50V K
R224	R30V		FA040302	CARBON 1/8W(T) 5% 3Kohm	C127			GB7101H3	CERAMIC Y5P(B)/T 100P/1KV K
R119	R129	R148	FA040472	CARBON 1/8W(T) 5% 4.7Kohm	C334			GB7152H3	CERAMIC Y5P(B)/T 1500P/1KV K
R173	R204	R282			C124	C304		GB7331H3	CERAMIC Y5P(B)/T 330P/1KV K
R291	R383	R391			C272	C341		GB7471F3	CERAMIC Y5P(B)/T 470P/500V K
R402	R403	R602			C110			GB747153	CERAMIC Y5P(B)/T 470P/50V K
R605	R610	R701			C204	C205	C267	GB210458	CERAMIC Y5V/T 0.1u/50V Z
R704	R710	R712			C282	C283	C284		
R716	R717	R718			C346	C350	C702		
R719	R722	R728			C709				
R729	R730	R733			C106			GB8103F5	CERAMIC Z5U(E)/T 0.01u/500V M
R768	R769	R770			C321	C310	C331	GB9103H8	CERAMIC Z5V(F)/T 0.01u/1KV Z
R739	R740	R771	FA040471	CARBON 1/8W(T) 5% 470ohm	C112	C149	C201		
JP1	R30P	R359	FA040473	CARBON 1/8W(T) 5% 47Kohm	C202	C203	C207		
VR201	VR202				C231	C270	C280		
R109	R115		FA040470	CARBON 1/8W(T) 5% 47ohm	C281	C291	C294		
R294	R295		FA040562	CARBON 1/8W(T) 5% 5.6Kohm	C299	C301	C409		
R390					C712	C724			
R303			FA040561	CARBON 1/8W(T) 5% 560ohm					

SYMBOL			PART NO	DESCRIPTION
C277			GB9332H8	CERAMIC Z5V(F)/T 3300P/1KV Z
C120	C138		GA110775	ELECT 105oC/A 100u/100V M TK
C214	C234	C254	GA210575	ELECT 105oC/T 1u/100V M
C288			GAB22675	ELECT 105oC/T 22u/100V M
C428			GA347485	ELECT 85oC/T 0.47u/250V M
C122			GA310815	ELECT 85oC/T 1000u/10V M
C372	C703		GA310725	ELECT 85oC/T 100u/16V M
C308	C410		GA310745	ELECT 85oC/T 100u/35V M
C113	C116	C143	GA310655	ELECT 85oC/T 10u/50V M
C150	C206	C210		
C230	C250	C292		
C293	C337	C338		
C604	C711	C726		
C727	C728			
C336	C340	C352	GA310555	ELECT 85oC/T 1u/50V M
C701	C710			
C339	C704		GA322555	ELECT 85oC/T 2.2u/50V M
C209			GA322725	ELECT 85oC/T 220u/16V M
C109			GA322645	ELECT 85oC/T 22u/35V M
C311			GA322655	ELECT 85oC/T 22u/50V M
C344			GA347585	ELECT 85oC/T 4.7u/250V M
C309			GA347555	ELECT 85oC/T 4.7u/50V M
C136	C330		GA347775	ELECT 85oC/T 470u/16V M
C108	C137	C151	GA347625	ELECT 85oC/T 47u/16V M
C285	C289	C335		
C725				
C368			GA347635	ELECT 85oC/T 47u/25V M
C354			GA347645	ELECT 85oC/T 47u/35V M
C313			GA347655	ELECT 85oC/T 47u/50V M
C121	C408		GAH10825	ELECT CAP 105oC/T 1000u/16V M TK
C119			GAH22675	ELECT CAP 105oC/T 22u/100V M TK
C156			GAH47555	ELECT CAP 105oC/T 4.7u/50V M TK
C139	C404		GAH47725	ELECT CAP 105oC/T 470u/16V M TK
C213	C233	C253	GA410575	ELECT NP/T 1u/100V M
C312			GF215252	MEF CAP BOX 0.0015u/50V J
C315			GF210252	MEF CAP BOX 0.001u/50V J
C115			GF233262	MEF CAP BOX 0.0033u/63V J
C366			GF256252	MEF CAP BOX 0.0056u/50V J
C362			GF282252	MEF CAP BOX 0.0082u/50V J
C365			GF210352	MEF CAP BOX 0.01u/50V J

SYMBOL			PART NO	DESCRIPTION
C360			GF215452	MEF CAP BOX 0.15u/50V J
C314			GF210452	MEF CAP BOX 0.1u/50V J
C114			GF210462	MEF CAP BOX 0.1u/63V J
C403			GF222452	MEF CAP BOX 0.22u/50V J
C345			GFA10382	PLASTIC MPE/A 0.01u/250V J
C329			GFA15482	PLASTIC MPE/A 0.15u/250V J
C333			GFA10582	PLASTIC MPE/A 1u/250V J
C351			GFB15482	PLASTIC MPP/A 0.15u/250V J
C356			GFB30482	PLASTIC MPP/A 0.3u/250V J
C325			GFB47482	PLASTIC MPP/A 0.47u/250V J
C355			GFB75482	PLASTIC MPP/A 0.75u/250V J
C332			GFD334E2	PLASTIC MPPS/A 0.33u/400V (PILKOR)
C307			GFD47482	PLASTIC MPPS/A 0.47u/250V J (MYLAR)
C271	C347	C401	GE210252	PLASTIC PEI/T 0.001u/50V J
C40A	C413		GE222252	PLASTIC PEI/T 0.0022u/50V J
C111	C370	C407	GF233252	PLASTIC PEI/T 0.0033u/50V J
C601			GE268252	PLASTIC PEI/T 0.0068u/50V J
C128	C142	C295	GE210352	PLASTIC PEI/T 0.01u/50V J
C296	C327	C363		
C603				
C123	C348		GE222352	PLASTIC PEI/T 0.022u/50V J
C316	C343	C364	GE247352	PLASTIC PEI/T 0.047u/50V J
C306	C317	C328	GE210452	PLASTIC PEI/T 0.1u/50V J
C358	C361			
C319			GED562M2	PLASTIC PPN/A 5600P/800V J
C318			GFC622J2	PLASTIC PPS/A 6200P/2KV J
C105			GKA227E5	POWER ELECT 85oC 220u/400V M
C101			GJ047400	SAFETY X-CAP 0.47u/275V M
C102			GJC102F5	SAFETY Y-CAP/D 1000P/400V M
C103	C104	C146	GJH102E5	SAFETY Y-CAP/S 1000P/400V M
C154				

The components specified for Model MS75F-3 Samsung CRT.

Note: The components identified by  make are critical for safety.

Replace only with parts Number specified.

SYMBOL	PART NO	DESCRIPTION
*** CRT & TUNER ***	80013481	CRT17"SAMAUNG M41QCJ761X172DFX
CRT		
*** ICS ***		
U702	80009941	ATMEL E ² ROM AT24C08B
U101	DD002600	IC LINEAR KA3842A 8P
U201	80000631	IC LM1281
U103	80000321	IC PHOTO COUPLE PS2561.TLP721F
O103	80003831	IC REGULATOR TL431 817B 4P
I401	80001041	IC TDA8172 (N.S.SGS)
U203	80003661	N.S VIDEO DRIVE IC LM2438
U701	80013001	N0701-2 VE MASK MCU
U301	80010251	OP AMP LM358 / KIA358
U204	80015661	OSD IC MTV016N (V2)
U302	80012941	PHILIPS IC TDA 4857
*** TRANSISTOR ***		
O101	EF202500	FET N 2SK2545 TO-220F TOSHIBA
O313	EF206301	FET N YTAF630 TO-220F
O308	FFA29610	TR 2SK2961 FET TOSHIBA
Q201	EAA12133	TR NPN 2SC1213AC TO-92(T)
O105	O107	TR NPN 2SC1815GR TO-92(T) (T.P.S.)
O113	O302	
O320	O323	
O401	O601	
O605	O606	
O303		TR NPN 2SC4002 TO-92(T) (SANYO)
O307		TR NPN 2SC5411(hfe) TO-3P
O321	O327	TR NPN 2SC945P TO-92(T) (N.P.S.)
O318		TR NPN 2SD1763 TO-220F
O304		TR NPN BF422 TO-92(T) (T.P)
O106		TR NPN KSC 2328A TO-92(T)(SAMSUNG)
O301		TR NPN PH2369 TO-92(T) (PHILIPS)
O310	O604	TR PNP 2SA1015GR TO-92(T) (T.P.S.)
O325	O326	TR PNP 2SA733P TO-92(T) (N.P.S.)
O702	O703	
O112		TR PNP BF423 TO-92(T)(T.P.)
O305		TR PNP BF423 TO-92(T)(T.P.)
O108	O317	TR PNP KSA 928A TO-92(T)(SAMSUNG)
O104		TR PNP KSB772 TO-126

SYMBOL	PART NO	DESCRIPTION
*** TRANSFORMERS ***		
T301	80009281	17" N0701F FBT
T302	80000281	H.DRIVE X'FM 4.5mH EI-19
T303	80015651	N0701F D.F. X'FM EI-19(1:10)
T101	80011211	POWER X'FM ERL35 500uH FE700+
*** VARIABLE RESISTORS ***		
VR101	FF300201	VR CARBON 6mm 200 ohm/B
VR210	FF300203	VR CARBON 6mm 20K/B
VR307	FF310104	VR CARBON 6mm 100K
*** RELAYS & SWITCHES ***		
RL101	80003751	RELAY 12V 6PGSA-SS-212DM(GOOD-SKY)
RL301	80010001	RELAY RUDH-SH-112D400ohm(GOOD SKY)
SW101	80012411	SW POWER 30V/0.3AJPS1258DS(Favortron)
SW701	80000251	TACT SW 1P 100G+50
SW301	80010621	WAFER 2Lx3P 2.54mm
*** COILS & FILTERS ***		
L201	L202	CHOKE COIL 100uH 8X10
L303	L304	CHOKE COIL 130uH 18X20 + BASE
L103	80003681	CHOKE T50-26B 200uH
G2.G4 WIRE	HA030010	EMI FILTER COIL 20.45X10.2X10
L301	80009291	H-CENTER CHOKE
L101	80000111	LINE FILTER ET24 10mH MIN
L102	HB000015	LINE FILTER UU10.5 1mH
L302	80011061	N0701F LINEARITY CHOKE 76uH
L307	80010401	N0701F LINEARITY COIL
L203	HB013159	PACKING COIL /T 1.5uH K(EC24)
J23	HB013100	PACKING COIL /T 10uH K(EC24)
*** PWB ASSYS ***		
	7C0215MS	CRT BOARD ASSY
	7M0215MS	MAIN BOARD ASSY
*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***		
SOCKET	80001751	17" 29D NECK CRT SOCKET
P101	JD512001	AC SOCKET 3P
F101	80001521	FUSE 3.15A/250V 50T T3.15A
FOR U101	JD010040	IC SOCKET 40P
DEGAUSSING COIL	80015641	MS75F-3 TCO DEGAUSSING
POWER CORD	80001651	POWER CORD 3P 1.8M EUROPE
CABLE	80012051	SIGNAL CABLE 20276 1.5M FOR PC+5V
TH101	80000801	THERMISTOR NTCR SCK054 13.3mm
TH102	80005821	THERMISTOR PTCR 4.5ohm
X701	EM012004	XTAL 49U 12MHz

SYMBOL	PART NO	DESCRIPTION
*** DIODES ***		
D107	D109	D10A
D117	D119	D125
D126	D127	D129
D202	D203	D204
D205	D210	D211
D230	D231	D250
D251	D302	D304
D311	D313	D314
D315	D317	D319
D320	D323	D325
D327	D332	D333
D334	D336	D337
D340	D344	D601
D602	D604	D605
D60A	D703	D704
D705		
D112	D113	D118
D110	D335	
D308		
D305	D306	D702
D101	D102	D103
D104		
D111		
D307		
D316		
D213	D214	D233
D234	D253	D254
D106	D108	D131
D303	D310	D345
D701		
D201	D301	D312
D318	D321	D322
D324	D328	D329
D330	D331	D341
D403		
D105	D116	D326
LED701		
ZD104		
ZD101		
ZD102		
ZD303	ZD701	ZD702
ZD703	ZD704	
ZD706		
EJ044148		DIODE "T" 1N4148
80003551		DIODE 200V/1.6A RG2Z SANKEN
80003561		DIODE 600V/1.6A RG2A SANKEN
80009541		DIODE FAGOR FUF5406 (A+K)
EJA05819		DIODE STKY/T 1A/40V 1N5819
EJB20001		DIODE/A 3A 1N5406
80011291		DIODE/A 3A/400V RG4()
80001171		DIODE/A 5TUZ47C (TOSHIBA)
80009261		DIODE/A RP3F(A+K) SANKEN
80000451		DIODE/T 1/2W 1SS83
EJAC0017		DIODE/T 1A 1N4936
EJAC0018		DIODE/T 1A 1N4937
EJA20003		DIODE/T 1A BA159
80000131		LED L-59GH/1GYC
EKA00603		ZEN DIODE 1/2W(T) 6B1 (HITACHI)
EKA0180B		ZEN DIODE 1/2W(T) HZS 18-2(HITACHI)
EKA01201		ZEN DIODE 1/2W(T) HZS12A2(HITACHI)
EKA00507		ZEN DIODE 1/2W(T) HZS5C2 (HITACHI)
EKA00607		ZEN DIODE 1/2W(T) HZS6C2 (HITACHI)

SYMBOL	PART NO	DESCRIPTION
*** APPEARANCE PARTS ***		
	10100924	CABINET BACK(PC+ABS)
	10101482	CABINET FRONT ASSY(PC+ABS)
	10101491	CABINET FRONT(PC+ABS)
	17000301	CUSHION PIECE(BACK)
	17000291	CUSHION SHEET
	17000451	CUSHION SHEET
	11000331	REVOLVING STAND ASSY
	11000251	REVOLVING STAND(B)(94HB)
	11000361	REVOLVING STAND(B)(94HB)
	11000261	REVOLVING STAND(T)(94HB)
*** PRINTED & PACKING MATERIALS ***		
	13201142	CARTON BOX MS75F-1(B Ver.)
	19700025	INSTRUCTION CD-ROM MS75/95F-1
	15000962	NAME PLATE INSTRUCTION MS75F-1(B Ver.)
	15500724	OWNERS MANUAL MS75F/95F-1(B Ver.)
	13400521	POLY(LON)(B)CARTON
	13400511	POLY(LON)(T)CARTON
*** RESISTORS ***		
R156	FA330159	CARBON 1/2W(T) 5% 1.5ohm
R325	FA330182	CARBON 1/2W(T) 5% 1.8Kohm
R114	FA330104	CARBON 1/2W(T) 5% 100Kohm
R287	FA330101	CARBON 1/2W(T) 5% 100ohm
R365	FA330154	CARBON 1/2W(T) 5% 150Kohm
R385	FA330150	CARBON 1/2W(T) 5% 15ohm
R182	FA330102	CARBON 1/2W(T) 5% 1Kohm
R367	FA330105	CARBON 1/2W(T) 5% 1Mohm
R417	FA330229	CARBON 1/2W(T) 5% 2.2ohm
R414	FA330331	CARBON 1/2W(T) 5% 330ohm
R30L	FA330470	CARBON 1/2W(T) 5% 47ohm
R308	FA330561	CARBON 1/2W(T) 5% 560ohm
R101	FA330684	CARBON 1/2W(T) 5% 680Kohm
R292	FA240101	CARBON 1/4W(T) 5% 100ohm
R206	FA240103	CARBON 1/4W(T) 5% 10Kohm
R10A	FA240113	CARBON 1/4W(T) 5% 11Kohm
R392	FA240154	CARBON 1/4W(T) 5% 150Kohm
R220	FA240151	CARBON 1/4W(T) 5% 150ohm
R163	FA240102	CARBON 1/4W(T) 5% 1Kohm
R609	FA240222	CARBON 1/4W(T) 5% 2.2Kohm
R118	FA240203	CARBON 1/4W(T) 5% 20Kohm
R393	FA240224	CARBON 1/4W(T) 5% 220Kohm

SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION
R278	R280	R290	FA240223	CARBON 1/4W(T) 5% 22Kohm	R386			FA040623	CARBON 1/8W(T) 5% 62Kohm
R30X			FA240271	CARBON 1/4W(T) 5% 270ohm	R319			FA040124	CARBON 1/8W(T) 5% 120Kohm
R116			FA240332	CARBON 1/4W(T) 5% 3.3Kohm	R201			FA040680	CARBON 1/8W(T) 5% 68ohm
R30T					R113	R382		FA040752	CARBON 1/8W(T) 5% 7.5Kohm
R104			FA240330	CARBON 1/4W(T) 5% 33 ohm	R212	R232	R252	FA040750	CARBON 1/8W(T) 5% 75ohm
R108	R286		FA240334	CARBON 1/4W(T) 5% 330Kohm	R336			FA040822	CARBON 1/8W(T) 5% 8.2Kohm
R117			FA240390	CARBON 1/4W(T) 5% 39ohm					
R343	R350		FA240472	CARBON 1/4W(T) 5% 4.7Kohm	R284			FA040821	CARBON 1/8W(T) 5% 820ohm
R30H	R30J		FA240754	CARBON 1/4W(T) 5% 750Kohm	R150	R157	R175	80002031	FUSEABLE RES 1/2W(A)M 0.22ohm
					R297			FB910229	FUSIBLE MF RES 1/4W 2.2ohm J
R107			FA240564	CARBON 1/4W(T) 5% 560Kohm	R31Q			FB241181	METAL 1/4W(T) 1% 1.18Kohm
R126			FA240681	CARBON 1/4W(T) 5% 680ohm	R31U			FB241202	METAL 1/4W(T) 1% 12Kohm
R322			FA040122	CARBON 1/8W(T) 5% 1.2Kohm					
R387			FA040132	CARBON 1/8W(T) 5% 1.3Kohm	R389			FB241372	METAL 1/4W(T) 1% 13.7Kohm
R205	R338	R708	FA040152	CARBON 1/8W(T) 5% 1.5Kohm	R366			FB241693	METAL 1/4W(T) 1% 169Kohm
R714					R149			FB241001	METAL 1/4W(T) 1% 1Kohm
					R410	R412		FB242501	METAL 1/4W(T) 1% 2.5Kohm
R703			FA040182	CARBON 1/8W(T) 5% 1.8Kohm	R31R			FB242701	METAL 1/4W(T) 1% 2.7Kohm
R155	R168	R31C	FA040104	CARBON 1/8W(T) 5% 100Kohm					
R327	R340	R373			R361			FB242002	METAL 1/4W(T) 1% 20Kohm
R375					R31N			FB242202	METAL 1/4W(T) 1% 22Kohm
R202	R203	R208	FA040101	CARBON 1/8W(T) 5% 100ohm	R344			FB242552	METAL 1/4W(T) 1% 25.5Kohm
R209	R221	R241			R711			FB243481	METAL 1/4W(T) 1% 3.48Kohm
R261	R306	R30N			R388			FB244300	METAL 1/4W(T) 1% 430ohm
R30Y	R31X	R331							
R332	R706	R707			J26			FB244702	METAL 1/4W(T) 1% 47Kohm
R724	R727	R742			R158			FB240470	METAL 1/4W(T) 1% 47ohm
R743	R761	R762			R31L			FB245102	METAL 1/4W(T) 1% 51Kohm
R110	R122	R161	FA040103	CARBON 1/8W(T) 5% 10Kohm	R348			FB245541	METAL 1/4W(T) 1% 5.54Kohm
R167	R288	R293			R349			FB245602	METAL 1/4W(T) 1% 56Kohm
R307	R30M	R30Q							
R310	R318	R330			R151			FB246242	METAL 1/4W(T) 1% 62.4Kohm
R345	R360	R368			R210	R230	R250	FB247509	METAL 1/4W(T) 1% 75ohm
R369	R377	R379			R411	R413		FB248201	METAL 1/4W(T) 1% 8.2Kohm
R601	R604	R612			R31T			FB241073	METAL 1/4W(T) 1% 107Kohm
R613	R709	R720			R169	R313	R314	FB910010	METAL 1/4W(T) 5% 1ohm
R736					R351				
R317			FA040106	CARBON 1/8W(T) 5% 10Mohm					
R353			FA040154	CARBON 1/8W(T) 5% 150Kohm	R415			FB470129	MOF 1W/M(A) 5% 1.2ohm
R154	R357		FA040153	CARBON 1/8W(T) 5% 15Kohm	R128	R606		FB470100	MOF 1W/M(A) 5% 10ohm
R362			FA040150	CARBON 1/8W(T) 5% 15ohm	R160			FB470153	MOF 1W/M(A) 5% 15Kohm
R112	R123	R132	FA040102	CARBON 1/8W(T) 5% 1Kohm	R421			FB470109	MOF 1W/M(A) 5% 1ohm
R289	R301	R401			R312			FB470270	MOF 1W/M(A) 5% 27ohm
R603					R422			FB470339	MOF 1W/M(A) 5% 3.3ohm

SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION
R159	R296	R315	FA040105	CARBON 1/8W(T) 5% 1Mohm	R103			FB470680	MOF 1W/M(A) 5% 68ohm
R395					R31A			FB480100	MOF 1W/M(B) 5% 10ohm
R608			FA040222	CARBON 1/8W(T) 5% 2.2Kohm	R105			FB560248	MOF 2W/M(A) 5% 0.24ohm
R305			FA040225	CARBON 1/8W(T) 5% 2.2Mohm	R354			FB560182	MOF 2W/M(A) 5% 1.8Kohm
R374			FA040204	CARBON 1/8W(T) 5% 200Kohm					
R223	R243	R263	FA040224	CARBON 1/8W(T) 5% 220Kohm	R125			FB560103	MOF 2W/M(A) 5% 10Kohm
R30C	R30E	R339			R335			FB560151	MOF 2W/M(A) 5% 150ohm
R270			FA040221	CARBON 1/8W(T) 5% 220ohm	R302			FB560222	MOF 2W/M(A) 5% 2.2Kohm
					R316			FB560331	MOF 2W/M(A) 5% 330ohm
R127	R130	R611	FA040223	CARBON 1/8W(T) 5% 22Kohm	R106			FB570563	MOF 2W/M(B) 5% 56Kohm
R726									
R30G			FA040220	CARBON 1/8W(T) 5% 22ohm	R309			FB710150	MOF 3W/M(A) 5% 15ohm
R363			FA040244	CARBON 1/8W(T) 5% 240Kohm	R311			FB710109	MOF 3W/M(A) 5% 1ohm
R364			FA040274	CARBON 1/8W(T) 5% 270Kohm	R304			80011181	RESISTOR FUSEABLE 1/2W(A)(M) 22ohm
R244	R264		FA040202	CARBON 1/8W(T) 5% 2Kohm	R394			FC030508	WOUND RES 1W(A) 5% 0.5ohm
					R111			FC110158	WOUND RES 2W(A) 5% 0.15ohm
R31P	R731		FA040332	CARBON 1/8W(T) 5% 3.3Kohm	*** CAPACITORS ***				
R358			FA040334	CARBON 1/8W(T) 5% 330Kohm	C707	C708		GB610157	CERAMIC SL/T 100P/50V J
R102	R31H	R31J	FA040331	CARBON 1/8W(T) 5% 330ohm	C353			GB633152	CERAMIC SL/T 330P/50V J
R715	R721				C705	C706		GB633052	CERAMIC SL/T 33P/50V J
R219	R239	R259	FA040333	CARBON 1/8W(T) 5% 33Kohm	SG301			80011281	CERAMIC SPARK CAPS 1KV +1500V-900V
R328									
R211	R231	R251	FA040330	CARBON 1/8W(T) 5% 33ohm	C276	C334	C357	GB7102H3	CERAMIC Y5P(B)/T 1000P/1KV K
R213	R233	R253	FA040391	CARBON 1/8W(T) 5% 390ohm	C275	C278	C287	GB7102F3	CERAMIC Y5P(B)/T 1000P/500V K
R713			FA040393	CARBON 1/8W(T) 5% 39Kohm	C297				
R224	R30V		FA040302	CARBON 1/8W(T) 5% 3Kohm	C605			GB710253	CERAMIC Y5P(B)/T 1000P/50V K
R119	R129	R148	FA040472	CARBON 1/8W(T) 5% 4.7Kohm	C127			GB7101H3	CERAMIC Y5P(B)/T 100P/1KV K
R173	R204	R282			C124	C304		GR7331H3	CERAMIC Y5P(B)/T 330P/1KV K
R291	R383	R391			C272	C341		GB7471F3	CERAMIC Y5P(B)/T 470P/500V K
R402	R403	R602							
R605	R610	R701			C110			GB747153	CERAMIC Y5P(B)/T 470P/50V K
R704	R710	R712			C204	C205	C267	GB210458	CERAMIC Y5V(T) 0.1u/50V Z
R716	R717	R718			C282	C283	C284		
R719	R722	R728			C346	C350	C702		
R729	R730	R733			C709				
R768	R769	R770			C106			GB8103F5	CERAMIC Z5U(E)/T 0.01u/500V M
R739	R740	R771	FA040471	CARBON 1/8W(T) 5% 470ohm	C321	C310	C331	GB9103H8	CERAMIC Z5V(F)/T 0.01u/1KV Z
JP1	R30P	R359	FA040473	CARBON 1/8W(T) 5% 47Kohm	C112	C149	C201	GB910358	CERAMIC Z5V(F)/T 0.01u/50V Z
VR201	VR202				C202	C203	C207		
R109	R115		FA040470	CARBON 1/8W(T) 5% 47ohm	C231	C270	C280		
R294	R295	R390	FA040562	CARBON 1/8W(T) 5% 5.6Kohm	C281	C291	C294		
R303			FA040561	CARBON 1/8W(T) 5% 560ohm	C299	C301	C409		
					C712	C724			

SYMBOL			PART NO	DESCRIPTION
C277			GB9332H8	CERAMIC Z5V(F)/T 3300P/1KV Z
C120	C138		GA110775	ELECT 105oC/A 100u/100V M TK
C214	C234	C254	GA210575	ELECT 105oC/T 1u/100V M
C288			GAB22675	ELECT 105oC/T 22u/100V M
C428			GA347485	ELECT 85oC/T 0.47u/250V M
C122			GA310815	ELECT 85oC/T 1000u/10V M
C372	C703		GA310775	ELECT 85oC/T 100u/16V M
C308	C410		GA310745	ELECT 85oC/T 100u/35V M
C113	C116	C143	GA310655	ELECT 85oC/T 10u/50V M
C150	C206	C210		
C230	C250	C292		
C293	C337	C338		
C604	C711	C726		
C727	C728			
C336	C340	C352	GA310555	ELECT 85oC/T 1u/50V M
C701	C710			
C339	C704		GA322555	ELECT 85oC/T 2.2u/50V M
C209			GA322725	ELECT 85oC/T 220u/16V M
C109			GA322645	ELECT 85oC/T 22u/35V M
C311			GA322655	ELECT 85oC/T 22u/50V M
C344			GA347585	ELECT 85oC/T 4.7u/250V M
C309			GA347555	ELECT 85oC/T 4.7u/50V M
C136	C330		GA347725	ELECT 85oC/T 470u/16V M
C108	C137	C151	GA347625	ELECT 85oC/T 47u/16V M
C285	C289	C335		
C725				
C368			GA347635	ELECT 85oC/T 47u/25V M
C354			GA347645	ELECT 85oC/T 47u/35V M
C313			GA347655	ELECT 85oC/T 47u/50V M
C121	C408		GAH10825	ELECT CAP 105oC/T 1000u/16V M TK
C119			GAH22675	ELECT CAP 105oC/T 22u/100V M TK
C156			GAH47555	ELECT CAP 105oC/T 4.7u/50V M TK
C139	C404		GAH47725	ELECT CAP 105oC/T 470u/16V M TK
C213	C233	C253	GA410575	ELECT NP/T 1u/100V M
C312			GF215252	MEF CAP BOX 0.0015u/50V J
C315			GF210252	MEF CAP BOX 0.001u/50V J
C115			GF233262	MEF CAP BOX 0.0033u/63V J
C366			GF256252	MEF CAP BOX 0.0056u/50V J
C362			GF282252	MEF CAP BOX 0.0082u/50V J
C365			GF210352	MEF CAP BOX 0.01u/50V J

SYMBOL			PART NO	DESCRIPTION
C360			GF215452	MEF CAP BOX 0.15u/50V J
C314			GF210452	MEF CAP BOX 0.1u/50V J
C114			GF210462	MEF CAP BOX 0.1u/63V J
C403			GF222452	MEF CAP BOX 0.22u/50V J
C345			GFA22382	PLASTIC MPE/A 0.022u/250V J
C329			GFA15482	PLASTIC MPE/A 0.15u/250V J
C333			GFA10582	PLASTIC MPE/A 1u/250V J
C351			GFB15482	PLASTIC MPP/A 0.15u/250V J
C356			GFB30482	PLASTIC MPP/A 0.3u/250V J
C325			GFB47482	PLASTIC MPP/A 0.47u/250V J
C355			GFB75482	PLASTIC MPP/A 0.75u/250V J
C332			GFD334E2	PLASTIC MPPS/A 0.33U/400V (PILKOR)
C307			GFD47482	PLASTIC MPPS/A 0.47u/250V J (MYLAR)
C271	C347	C401	GE210252	PLASTIC PEI/T 0.001u/50V J
C40A	C413		GE222252	PLASTIC PEI/T 0.0022u/50V J
C111	C320	C407	GE233252	PLASTIC PEI/T 0.0033u/50V J
C601			GE268252	PLASTIC PEI/T 0.0068u/50V J
C128	C142	C295	GE210352	PLASTIC PEI/T 0.01u/50V J
C296	C327	C363		
C603				
C123	C348		GE222352	PLASTIC PEI/T 0.022u/50V J
C316	C343	C364	GF247352	PLASTIC PEI/T 0.047u/50V J
C306	C317	C328	GF210452	PLASTIC PEI/T 0.1u/50V J
C358	C361			
C319			GED562M2	PLASTIC PPN/A 5600P/800V J
C318			GFC622J2	PLASTIC PPS/A 6200P/2KV J
C105			GKA227E5	POWER ELECT 85oC 220u/400V M
C101			GJ047400	SAFETY X-CAP 0.47u/275V M
C102			GJC102E5	SAFETY Y-CAP/D 1000P/400V M
C103	C104	C146	GJH102E5	SAFETY Y-CAP/S 1000P/400V M
C154				

The components specified for Model MS75F-3 LG CRT.

Note: The components identified by  make are critical for safety.

Replace only with parts Number specified.

SYMBOL	PART NO	DESCRIPTION
*** CRT & TUNER ***	***	***
CRT	80013321	CRT 17" LG M41QEE903X03
*** ICS ***	***	***
U702	80009941	ATMEL E ² ROM AT24C08B
U101	DD002600	IC LINEAR KA3842A 8P
U201	80000631	IC LM1281
U103	80000321	IC PHOTO COUPLE PS2561.TLP721F
O103	80003831	IC REGULATOR TL431 817B 4P
I401	80001041	IC TDA8172 (N.S.SGS)
U203	80003661	N.S VIDEO DRIVE IC LM2438
U701	80013001	N0701-2 VE MASK MCU
U301	80010251	OP AMP LM358 / KIA358
U204	80015661	OSD IC MTV016N (V2)
U302	80012941	PHILIPS IC TDA 4857
*** TRANSISTOR ***	***	***
O101	EF202500	FET N 2SK2545 TO-220F TOSHIBA
O313	EF206301	FET N YTA630 TO-220F
O308	FFA29610	TR 2SK2961 FET TOSHIBA
Q201	EAA12133	TR NPN 2SC1213AC TO-92(T)
O105	O107	TR NPN 2SC1815GR TO-92(T) (T.P.S.)
O113	O302	
O320	O323	
O401	O601	
O605	O606	
O303		TR NPN 2SC4002 TO-92(T) (SANYO)
O307		TR NPN 2SC5411(hfe) TO-3P
O321	O327	TR NPN 2SC945P TO-92(T) (N.P.S.)
O318		TR NPN 2SD1763 TO-220F
O304		TR NPN BF422 TO-92(T) (T.P)
O106		TR NPN KSC 2328A TO-92(T) (SAMSUNG)
O301		TR NPN PH2369 TO-92(T) (PHILIPS)
O310	O604	TR PNP 2SA1015GR TO-92(T) (T.P.S.)
O325	O326	TR PNP 2SA733P TO-92(T) (N.P.S.)
O702	O703	
O112		TR PNP BF423 TO-92(T)(T.P.)
O305		TR PNP BF423 TO-92(T)(T.P.)
O108		TR PNP KSA 928A TO-92(T)(SAMSUNG)
O317		TR PNP KSA 928A TO-92(T)(SAMSUNG)
O104		TR PNP KSB772 TO-126

SYMBOL	PART NO	DESCRIPTION
*** TRANSFORMERS ***	***	***
T301	80009281	17" N0701F FBT
T302	80000281	H.DRIVE X'FM 4.5mH EI-19
T303	80013361	N1701F D.F X'FM EI-19(1:9)
T101	80011211	POWER X'FM ERL35 500uH FE700+
*** VARIABLE RESISTORS ***	***	***
VR101	FF300201	VR CARBON 6mm 200 ohm/B
VR210	FF300203	VR CARBON 6mm 20K/B
VR307	FF310104	VR CARBON 6mm 100K
*** RELAYS & SWITCHES ***	***	***
RL101	80003751	RELAY 12V 6P GSA-SS-212DM(GOOD-SKY)
RL301	80010001	RELAY RUDH-SH-112D400ohm(GOOD SKY)
SW101	80012411	SW POWER 30V/0.3AJPS1258DS(Favortron)
SW701	80000251	TACT SW 1P 100G+50
SW301	80010621	WAFER 2Lx3P 2.54mm
*** COILS & FILTERS ***	***	***
L201	L202	CHOKE COIL 100uH 8X10
L303	L304	CHOKE COIL 130uH 18X20 + BASE
L103	80003681	CHOKE T50-26B 200uH
G2.G4 WIRE	HA030010	EMI FILTER COIL 20.45X10.2X10
L301	80009291	H-CENTER CHOKE
L101	80000111	LINE FILTER ET24 10mH MIN
L102	HB000015	LINE FILTER UU10.5 1mH
L302	80015151	N0701F LINEARITY CHOKE 130uH
L307	80010401	N0701F LINEARITY COIL
L203	HB013159	PACKING COIL /T 1.5uH K(EC24)
J23	HB013100	PACKING COIL /T 10uH K(EC24)
*** PWB ASSYS ***	***	***
	7C0215ML	CRT BOARD ASSY
	7M0215ML	MAIN BOARD ASSY
*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***	***	***
SOCKET	80001751	17" 29D NECK CRT SOCKET
P101	JD512001	AC SOCKET 3P
F101	80001521	FUSE 3.15A/250V 50T T3.15A
FOR U701	JD010040	IC SOCKET 40P
DEGAUSSING COIL	80015641	MS75F-3 TCO DEGAUSSING
POWER CORD	80001651	POWER CORD 3P 1.8M EUROPE
CABLE	80012051	SIGNAL CABLE 20276 1.5M FOR PC+5V
TH101	80000801	THERMISTOR NTCR SCK054 13.3mm
TH102	80005821	THERMISTOR PTCR 4.5ohm
X701	EM012004	X'TAL 49U 12MHz

SYMBOL	PART NO	DESCRIPTION
*** DIODES ***	***	***
D107	D109	DIODE "T" 1N4148
D117	D119	
D126	D127	
D202	D203	
D205	D210	
D230	D231	
D251	D302	
D311	D313	
D315	D317	
D320	D323	
D327	D332	
D334	D336	
D340	D344	
D602	D604	
D60A	D703	
D705		
D112	D113	
D110	D335	
D308		
D305	D306	
D101	D102	
D104		
D111		
D307		
D316		
D213	D214	
D234	D253	
D106	D108	
D303	D310	
D701		
D201	D301	
D318	D321	
D324	D328	
D330	D331	
D403		
D105	D116	
LED701		
ZD104		
ZD101		
ZD102		
ZD303	ZD701	
ZD703	ZD704	
ZD706		

SYMBOL	PART NO	DESCRIPTION
*** APPEARANCE PARTS ***	***	***
	10100924	CABINET BACK(PC+ABS)
	10101482	CABINET FRONT ASSY(PC+ABS)
	10101491	CABINET FRONT(PC+ABS)
	17000301	CUSHION PIECE(BACK)
	17000291	CUSHION SHEET
	17000451	CUSHION SHEET
	11000331	REVOLVING STAND ASSY
	11000251	REVOLVING STAND(B)(94HB)
	11000361	REVOLVING STAND(B)(94HB)
	11000261	REVOLVING STAND(T)(94HB)
*** PRINTED & PACKING MATERIALS ***	***	***
	13201142	CARTON BOX MS75F-1(B Ver.)
	19700025	INSTRUCTION CD-ROM MS75/95F-1
	15000962	NAME PLATE INSTRUCTION MS75F-1(B Ver.)
	15500724	OWNERS MANUAL MS75F/95F-1(B Ver.)
	13400521	POLYLON(B)CARTON
	13400511	POLYLON(T)CARTON
*** RESISTORS ***	***	***
R156	FA330159	CARBON 1/2W(T) 5% 1.5ohm
R325	FA330182	CARBON 1/2W(T) 5% 1.8Kohm
R114	FA330104	CARBON 1/2W(T) 5% 100Kohm
R287	FA330101	CARBON 1/2W(T) 5% 100ohm
R365	FA330154	CARBON 1/2W(T) 5% 150Kohm
R385	FA330150	CARBON 1/2W(T) 5% 15ohm
R182	FA330102	CARBON 1/2W(T) 5% 1Kohm
R367	FA330105	CARBON 1/2W(T) 5% 1Mohm
R417	FA330229	CARBON 1/2W(T) 5% 2.2ohm
R414	FA330331	CARBON 1/2W(T) 5% 330ohm
R30L	FA330470	CARBON 1/2W(T) 5% 47ohm
R308	FA330561	CARBON 1/2W(T) 5% 560ohm
R101	FA330684	CARBON 1/2W(T) 5% 680Kohm
R292	FA240101	CARBON 1/4W(T) 5% 100ohm
R206	FA240103	CARBON 1/4W(T) 5% 10Kohm
R10A	FA240113	CARBON 1/4W(T) 5% 11Kohm
R392	FA240154	CARBON 1/4W(T) 5% 150Kohm
R220	FA240151	CARBON 1/4W(T) 5% 150ohm
R163	FA240102	CARBON 1/4W(T) 5% 1Kohm
R609	FA240222	CARBON 1/4W(T) 5% 2.2Kohm
R118	FA240203	CARBON 1/4W(T) 5% 20Kohm
R393	FA240224	CARBON 1/4W(T) 5% 220Kohm

SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION
R278	R280	R290	FA240223	CARBON 1/4W(T) 5% 22Kohm	R386			FA040623	CARBON 1/8W(T) 5% 62Kohm
R30X			FA240271	CARBON 1/4W(T) 5% 270ohm	R319			FA040683	CARBON 1/8W(T) 5% 68Kohm
R116			FA240332	CARBON 1/4W(T) 5% 3.3Kohm	R201			FA040680	CARBON 1/8W(T) 5% 68ohm
R30T					R113	R382		FA040752	CARBON 1/8W(T) 5% 7.5Kohm
R104			FA240330	CARBON 1/4W(T) 5% 33 ohm	R212	R232	R252	FA040750	CARBON 1/8W(T) 5% 75ohm
R108	R286		FA240334	CARBON 1/4W(T) 5% 330Kohm	R284			FA040821	CARBON 1/8W(T) 5% 820ohm
R117			FA240390	CARBON 1/4W(T) 5% 39ohm	R150	R157	R175	80002031	FUSEABLE RES 1/2W(A)M 0.22ohm
R343	R350		FA240472	CARBON 1/4W(T) 5% 4.7Kohm	R297			FB910229	FUSIBLE MF RES 1/4W 2.2ohm J
R30H	R30J		FA240754	CARBON 1/4W(T) 5% 750Kohm	R31Q			FB241181	METAL 1/4W(T) 1% 1.18Kohm
R107			FA240564	CARBON 1/4W(T) 5% 560Kohm	R31U			FB241202	METAL 1/4W(T) 1% 12Kohm
R126			FA240681	CARBON 1/4W(T) 5% 680ohm	R389			FB241372	METAL 1/4W(T) 1% 13.7Kohm
R322			FA040122	CARBON 1/8W(T) 5% 1.2Kohm	R366			FB241503	METAL 1/4W(T) 1% 150Kohm
R387			FA040132	CARBON 1/8W(T) 5% 1.3Kohm	R149			FB241001	METAL 1/4W(T) 1% 1Kohm
R205	R338	R714	FA040152	CARBON 1/8W(T) 5% 1.5Kohm	R410	R412		FB242501	METAL 1/4W(T) 1% 2.5Kohm
R703			FA040182	CARBON 1/8W(T) 5% 1.8Kohm	R31R			FB242701	METAL 1/4W(T) 1% 2.7Kohm
R155	R168	R31C	FA040104	CARBON 1/8W(T) 5% 100Kohm	R361			FB242002	METAL 1/4W(T) 1% 20Kohm
R327	R340	R373			R31N			FB242202	METAL 1/4W(T) 1% 22Kohm
R375					R344			FB242552	METAL 1/4W(T) 1% 25.5Kohm
R202	R203	R208	FA040101	CARBON 1/8W(T) 5% 100ohm	R711			FB243481	METAL 1/4W(T) 1% 3.48Kohm
R209	R221	R241			R388			FB245490	METAL 1/4W(T) 1% 54ohm
R261	R306	R30N			J26			FB244702	METAL 1/4W(T) 1% 47Kohm
R30Y	R31X	R331			R158			FB240470	METAL 1/4W(T) 1% 47ohm
R332	R706	R707			R31L			FB245102	METAL 1/4W(T) 1% 51Kohm
R724	R727	R742			R348			FB245541	METAL 1/4W(T) 1% 5.54Kohm
R743	R761	R762			R349			FB245602	METAL 1/4W(T) 1% 56Kohm
R110	R122	R161	FA040103	CARBON 1/8W(T) 5% 10Kohm	R151			FB246242	METAL 1/4W(T) 1% 62.4Kohm
R167	R288	R293			R210	R230	R250	FB247509	METAL 1/4W(T) 1% 75ohm
R307	R30M	R30Q			R411	R413		FB248201	METAL 1/4W(T) 1% 8.2Kohm
R310	R318	R330			R31T			FB241053	METAL 1/4W(T) 1% 105Kohm
R345	R360	R368			R169	R313	R314	FB910010	METAL 1/4W(T) 5% 1ohm
R369	R377	R379			R351				
R601	R604	R612			R415			FB470119	MOF 1W/M(A) 5% 1.1ohm
R613	R709	R720			R128	R606		FB470100	MOF 1W/M(A) 5% 10ohm
R736			FA040106	CARBON 1/8W(T) 5% 10Mohm	R160			FB470153	MOF 1W/M(A) 5% 15Kohm
R317					R421			FB470109	MOF 1W/M(A) 5% 1ohm
R353			FA040154	CARBON 1/8W(T) 5% 150Kohm	R312			FB470270	MOF 1W/M(A) 5% 27ohm
R154	R357		FA040153	CARBON 1/8W(T) 5% 15Kohm	R422			FB470339	MOF 1W/M(A) 5% 3.3ohm
R362			FA040150	CARBON 1/8W(T) 5% 15ohm					
R112	R123	R132	FA040102	CARBON 1/8W(T) 5% 1Kohm					
R289	R301	R401							
R603									

SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION
R159	R296	R315	FA040105	CARBON 1/8W(T) 5% 1Mohm	R103			FB470680	MOF 1W/M(A) 5% 68ohm
R395					R31A			FB480100	MOF 1W/M(B) 5% 10ohm
R608	R708		FA040222	CARBON 1/8W(T) 5% 2.2Kohm	R105			FB560248	MOF 2W/M(A) 5% 0.24ohm
R305			FA040225	CARBON 1/8W(T) 5% 2.2Mohm	R354			FB560182	MOF 2W/M(A) 5% 1.8Kohm
R374			FA040204	CARBON 1/8W(T) 5% 200Kohm	R125			FB560103	MOF 2W/M(A) 5% 10Kohm
R223	R243	R263	FA040224	CARBON 1/8W(T) 5% 220Kohm	R335			FB560151	MOF 2W/M(A) 5% 150ohm
R30C	R30E	R339			R302			FB560222	MOF 2W/M(A) 5% 2.2Kohm
R270			FA040221	CARBON 1/8W(T) 5% 220ohm	R316			FB560331	MOF 2W/M(A) 5% 330ohm
R127	R130	R611	FA040223	CARBON 1/8W(T) 5% 22Kohm	R106			FB570563	MOF 2W/M(B) 5% 56Kohm
R726					R309			FB710150	MOF 3W/M(A) 5% 15ohm
R30G			FA040220	CARBON 1/8W(T) 5% 22ohm	R311			FB710109	MOF 3W/M(A) 5% 1ohm
R363			FA040244	CARBON 1/8W(T) 5% 240Kohm	R304			80011181	RESISTOR FUSEABLE 1/2W(A)M 22ohm
R364			FA040274	CARBON 1/8W(T) 5% 270Kohm	R394			FC030508	WOUND RES 1W(A) 5% 0.5ohm
R244	R264		FA040202	CARBON 1/8W(T) 5% 2Kohm	R111			FC110158	WOUND RES 2W(A) 5% 0.15ohm
R31P	R731		FA040332	CARBON 1/8W(T) 5% 3.3Kohm	*** CAPACITORS ***				
R358			FA040334	CARBON 1/8W(T) 5% 330Kohm	C707	C708		GB610152	CERAMIC SLT 100P/50V J
R102	R31H	R31J	FA040331	CARBON 1/8W(T) 5% 330ohm	C353			GB633152	CERAMIC SLT 330P/50V J
R715	R721				C705	C706		GB633052	CERAMIC SLT 33P/50V J
R219	R239	R259	FA040333	CARBON 1/8W(T) 5% 33Kohm	SG301			80011281	CERAMIC SPARK CAPS 1KV +1500V-900V
R328					C276	C334	C357	GB7102H3	CERAMIC Y5P(B)/T 1000P/1KV K
R211	R231	R251	FA040330	CARBON 1/8W(T) 5% 33ohm	C275	C278	C287	GB7102F3	CERAMIC Y5P(B)/T 1000P/500V K
R213	R233	R253	FA040391	CARBON 1/8W(T) 5% 390ohm	C297			C605	CERAMIC Y5P(B)/T 1000P/50V K
R713			FA040393	CARBON 1/8W(T) 5% 39Kohm	C127			GB710253	CERAMIC Y5P(B)/T 100P/1KV K
R224	R30V		FA040302	CARBON 1/8W(T) 5% 3Kohm	C124	C304		GB7331H3	CERAMIC Y5P(B)/T 330P/1KV K
R119	R129	R148	FA040472	CARBON 1/8W(T) 5% 4.7Kohm	C272	C341		GB7471F3	CERAMIC Y5P(B)/T 470P/500V K
R173	R204	R282			C110			GB747153	CERAMIC Y5P(B)/T 470P/50V K
R291	R383	R391			C204	C205	C267	GB210458	CERAMIC Y5V/T 0.1u/50V Z
R402	R403	R602			C282	C283	C284		
R605	R610	R701			C346	C350	C702		
R704	R710	R712			C709				
R716	R717	R718			C106			GB8103F5	CERAMIC Z5U(E)/T 0.01u/500V M
R719	R722	R728			C321	C310	C331	GB9103H8	CERAMIC Z5V(F)/T 0.01u/1KV Z
R729	R730	R733			C112	C149	C201	GB910358	CERAMIC Z5V(F)/T 0.01u/50V Z
R768	R769	R770			C202	C203	C207		
R739	R740	R771	FA040471	CARBON 1/8W(T) 5% 470ohm	C231	C270	C280		
JP1	R30P	R359	FA040473	CARBON 1/8W(T) 5% 47Kohm	C281	C291	C294		
VR201	VR202				C299	C301	C409		
R109	R115		FA040470	CARBON 1/8W(T) 5% 47ohm	C712	C724			
R294	R295	R336	FA040562	CARBON 1/8W(T) 5% 5.6Kohm					
R390			FA040561	CARBON 1/8W(T) 5% 560ohm					
R303									

SYMBOL			PART NO	DESCRIPTION
C277			GB9332H8	CERAMIC Z5V(F)/T 3300P/1KV Z
C120	C138		GA110775	ELECT 105oC/A 100u/100V M TK
C214	C234	C254	GA210575	ELECT 105oC/T 1u/100V M
C288			GAB22675	ELECT 105oC/T 22u/100V M
C428			GA347485	ELECT 85oC/T 0.47u/250V M
C122			GA310815	ELECT 85oC/T 1000u/10V M
C372	C703		GA310725	ELECT 85oC/T 100u/16V M
C308	C410		GA310745	ELECT 85oC/T 100u/35V M
C113	C116	C143	GA310655	ELECT 85oC/T 10u/50V M
C150	C206	C210		
C230	C250	C292		
C293	C337	C338		
C604	C711	C726		
C727	C728			
C336	C340	C352	GA310555	ELECT 85oC/T 1u/50V M
C701	C710			
C339	C704		GA322555	ELECT 85oC/T 2.2u/50V M
C209			GA322725	ELECT 85oC/T 220u/16V M
C109			GA322645	ELECT 85oC/T 22u/35V M
C311			GA322655	ELECT 85oC/T 22u/50V M
C344			GA347585	ELECT 85oC/T 4.7u/250V M
C309			GA347555	ELECT 85oC/T 4.7u/50V M
C136	C330		GA347725	ELECT 85oC/T 470u/16V M
C108	C137	C151	GA347625	ELECT 85oC/T 47u/16V M
C285	C289	C335		
C725				
C368			GA347635	ELECT 85oC/T 47u/25V M
C354			GA347645	ELECT 85oC/T 47u/35V M
C313			GA347655	ELECT 85oC/T 47u/50V M
C121	C408		GAH10825	ELECT CAP 105oC/T 1000u/16V M TK
C119			GAH22675	ELECT CAP 105oC/T 22u/100V M TK
C156			GAH47555	ELECT CAP 105oC/T 4.7u/50V M TK
C139	C404		GAH47725	ELECT CAP 105oC/T 470u/16V M TK
C213	C233	C253	GA410575	ELECT NP/T 1u/100V M
C312			GF215252	MEF CAP BOX 0.0015u/50V J
C315			GF210252	MEF CAP BOX 0.001u/50V J
C115			GF233262	MEF CAP BOX 0.0033u/63V J
C366			GF256252	MEF CAP BOX 0.0056u/50V J
C362			GF282252	MEF CAP BOX 0.0082u/50V J
C365			GF210352	MEF CAP BOX 0.01u/50V J

SYMBOL			PART NO	DESCRIPTION
C360			GF215452	MEF CAP BOX 0.15u/50V J
C314			GF210452	MEF CAP BOX 0.1u/50V J
C114			GF210462	MEF CAP BOX 0.1u/63V J
C403			GF222452	MEF CAP BOX 0.22u/50V J
C345			GFA10382	PLASTIC MPE/A 0.01u/250V J
C329			GFA15482	PLASTIC MPE/A 0.15u/250V J
C333			GFA10582	PLASTIC MPE/A 1u/250V J
C351			GFB15482	PLASTIC MPP/A 0.15u/250V J
C356			GFB30482	PLASTIC MPP/A 0.3u/250V J
C325			GFB47482	PLASTIC MPP/A 0.47u/250V J
C355			GFB75482	PLASTIC MPP/A 0.75u/250V J
C332			GFD304E2	PLASTIC MPPS/A 0.3u/400V J (PILKOR)
C307			GFD47482	PLASTIC MPPS/A 0.47u/250V J (MYLAR)
C271	C347	C401	GE210252	PLASTIC PEI/T 0.001u/50V J
C40A	C413		GE222252	PLASTIC PEI/T 0.0022u/50V J
C111	C320	C407	GE233252	PLASTIC PEI/T 0.0033u/50V J
C601			GE268252	PLASTIC PEI/T 0.0068u/50V J
C128	C142	C295	GE210352	PLASTIC PEI/T 0.01u/50V J
C296	C327	C363		
C603				
C123	C348		GE222352	PLASTIC PEI/T 0.022u/50V J
C316	C343	C364	GE247352	PLASTIC PEI/T 0.047u/50V J
C306	C317	C328	GE210452	PLASTIC PEI/T 0.1u/50V J
C358	C361			
C319			GF0562M2	PLASTIC PPN/A 5600P/800V J
C318			GFC622J2	PLASTIC PPS/A 6200P/2KV J
C105			GKA227E5	POWER ELECT 85oC 220u/400V M
C101			GJ047400	SAFETY X-CAP 0.47u/275V M
C102			GJC102E5	SAFETY Y-CAP/D 1000P/400V M
C103	C104	C146	GJH102E5	SAFETY Y-CAP/S 1000P/400V M
C154				

The components specified for Model AS75F-3 ORION CRT.

Note: The components identified by  make are critical for safety.

Replace only with parts Number specified.

SYMBOL			PART NO	DESCRIPTION
*** CRT & TUNER ***			***	
CRT			80013331	CRT 17" ORION M41QEC200XX021
*** ICS ***				
U702			80009941	ATMEL E ² ROM AT24C08B
U101			DD002600	IC LINEAR KA3842A 8P
U201			80000631	IC LM1281
U103			80000321	IC PHOTO COUPLE PS2561.TLP721F
O103			80003831	IC REGULATOR TL431 817B 4P
U401			80001041	IC TDA8172 (N.S,SGS)
U203			80003661	N.S VIDEO DRIVE IC LM2438
U701			80013001	N0701-2 VE MASK MCU
U301			80010251	OP AMP LM358 / KIA358
U204			80015661	OSD IC MTV016N (V2)
U302			80012941	PHILIPS IC TDA 4857
*** TRANSISTOR ***				
O101			EF202500	FET N 2SK2545 TO-220F TOSHIBA
O313	O319	O322	EF206301	FET N YTA630 TO-220F
O308			EFA29610	TR 2SK2961 FET TOSHIBA
Q201			EAA12133	TR NPN 2SC1213AC TO-92(T)
O105	O107	O110	EAA18157	TR NPN 2SC1815GR TO-92(T) (T.P.S.)
O113	O302	O306		
O320	O323	O324		
O401	O601	O603		
O605	O606			
O303			EAA40020	TR NPN 2SC4002 TO-92(T) (SANYO)
O307			80005721	TR NPN 2SC5411(hfe) TO-3P
O321	O327		EAA09456	TR NPN 2SC945P TO-92(T) (N.P.S.)
O318			80008141	TR NPN 2SD1763 TO-220F
O304			EAA04220	TR NPN BF422 TO-92(T) (T.P)
O106			EAA23281	TR NPNKSC2328ATO-92(T)(SAMSUNG)
O301			EAA23690	TR NPN PH2369 TO-92(T) (PHILIPS)
O310	O604		EBA10157	TR PNP 2SA1015GR TO-92(T) (T.P.S.)
O325	O326	O701	EBA07336	TR PNP 2SA733P TO-92(T) (N.P.S.)
O702	O703			
O112	O305		EBA04230	TR PNP BF423 TO-92(T)(T.P.)
O108	O317		EBA09281	TR PNP KSA 928A TO-92(T)(SAMSUNG)
O104			EB307720	TR PNP KSB772 TO-126

SYMBOL			PART NO	DESCRIPTION
ZD303	ZD701	ZD702	EKA00507	ZEN DIODE 1/2W(T) HZS5C2 (HITACHI)
ZD703	ZD704			
ZD706			EKA00607	ZEN DIODE 1/2W(T) HZS6C2 (HITACHI)
*** TRANSFORMERS ***				
T301			80009281	17" N0701F FBT
T302			80000281	H.DRIVE X'FM 4.5mH EI-19
T303			80013361	N1701F D.F X'FM EI-19(1:9)
T101			80011211	POWER X'FM ERL35 500uH FE700+
*** VARIABLE RESISTORS ***				
VR101			FF300201	VR CARBON 6mm 200 ohm/B
VR210	VR230	VR250	FF300203	VR CARBON 6mm 20K/B
VR307			FF310104	VR CARBON 6mm 100K
*** RELAYS & SWITCHES ***				
RL101			80003751	RELAY 12V 6P GSA-SS-212DM(GOOD-SKY)
RL301			80010001	RELAY RUDH-SH-112D400ohm(GOOD SKY)
SW101			80012411	SW POWER30V/0.3A JPS1258DS(Favortron)
SW701	SW702	SW703	80000251	TACT SW 1P 100G+-50
SW301			80010621	WAFFER 2Lx3P 2.54mm
*** COILS & FILTERS ***				
L201	L202		HB000008	CHOKE COIL 100uH 8X10
L303			80015701	CHOKE COIL 120uH 18X20 + BASE
L304			80001811	CHOKE COIL 130uH 18X20 + BASE
L103			80003681	CHOKE T50-26B 200uH
G2.G4 WIRE			HA030010	EMI FILTER COIL 20.45X10.2X10
L301			80009291	H-CENTER CHOKE
L101			80000111	LINE FILTER ET24 10mH MIN
L102			HB000015	LINE FILTER UU10.5 1mH
L302			80005311	LINEARITY CHOKE 30uH
L307			80015691	N1701F LINEARITY FOR ORION CRT
L203	L204	L205	HB013159	PACKING COIL /T 1.5uH K(EC24)
J23			HB013100	PACKING COIL /T 10uH K(EC24)
*** PWB ASSYS ***				
			7C0215MO	CRT BOARD ASSY
			7M0216MO	MAIN BOARD ASSY
*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***				
SOCKET			80001751	17" 29D NECK CRT SOCKET
DEGUSSING COIL			80010551	17" N0701F MPRII DEGAUSSING
P101			JD512001	AC SOCKET 3P
F101			80001521	FUSE 3.15A/250V 50T T3.15A
FOR U701			JD010040	IC SOCKET 40P

SYMBOL			PART NO	DESCRIPTION
*** DIODES ***				
D107	D109	D10A	EJ044148	DIODE "T" 1N4148
D117	D119	D125		
D126	D127	D129		
D202	D203	D204		
D205	D210	D211		
D230	D231	D250		
D251	D302	D304		
D311	D313	D314		
D315	D317	D319		
D320	D323	D325		
D327	D332	D333		
D334	D336	D337		
D340	D344	D601		
D602	D604	D605		
D60A	D703	D704		
D705				
D112	D113	D118	80003551	DIODE 200V/1.6A RG2Z SANKEN S
D110	D335		80003561	DIODE 600V/1.6A RG2A SANKEN S
D308			80009541	DIODE FAGOR FUF5406 S (A+K)
D305	D306	D702	EJA05819	DIODE STKY/T 1A/40V 1N5819
D101	D102	D103	EJB20001	DIODE/A 3A 1N5406
D104				
D111			80011291	DIODE/A 3A/400V RG4()
D307			80001171	DIODE/A 5TUZ47C (TOSHIBA)
D316			80009261	DIODE/A RP3F(A+K) SANKEN
D213	D214	D233	80000451	DIODE/T 1/2W 1SS83
D234	D253	D254		
D106	D108	D131	EJAC0017	DIODE/T 1A 1N4936
D303	D310	D345		
D701				
D201	D301	D312	EJAC0018	DIODE/T 1A 1N4937
D318	D321	D322		
D324	D328	D329		
D330	D331	D341		
D403				
D105	D116	D326	EJA20003	DIODE/T 1A BA159
LED701			80000131	LED L-59GH/1GYC
ZD104			EKA00603	ZEN DIODE 1/2W(T) 6B1 (HITACHI)
ZD101			EKA0180B	ZEN DIODE 1/2W(T) HZS 18-2(HITACHI)
ZD102			EKA01201	ZEN DIODE 1/2W(T) HZS12A2(HITACHI)

SYMBOL			PART NO	DESCRIPTION
POWER CORD			80001631	POWER CORD 3P1.8 NON-SHIELDCOLORSG8508
CABLE			80012051	SIGNAL CABLE 20276 1.5M FOR PC+5V
TH101			80000801	THERMISTOR NTCR SCK054 13.3mm
TH102			80005821	THERMISTOR PTCR 4.5ohm
X701			EM012004	XTAL 49U 12MHz
*** APPEARANCE PARTS ***				
			10100594	CABINET BACK
			10101341	CABINET FRONT
			10101332	CABINET FRONT ASSY
			17000301	CUSHION PIECE(BACK)
			17000291	CUSHION SHEET
			17000451	CUSHION SHEET
			11000331	REVOLVING STAND ASSY
			11000251	REVOLVING STAND(B)(94HB)
			11000361	REVOLVING STAND(B)(94HB)
			11000362	REVOLVING STAND(B)(94HB)
			11000261	REVOLVING STAND(T)(94HB)
			11000262	REVOLVING STAND(T)(94HB)
*** PRINTED & PACKING MATERIALS ***				
B/C LABEL			13201101	CARTON BOX (AS75F-1)
			15000971	NAME PLATE INSTRUCTION (AS75F-1)
			15500712	OWNERS MANUAL (AS75F-3)
			13400521	POLYLON(B)CARTON
			13400511	POLYLON(T)CARTON
*** RESISTORS ***				
R156			FA330159	CARBON 1/2W(T) 5% 1.5ohm
R325			FA330182	CARBON 1/2W(T) 5% 1.8Kohm
R114	R120		FA330104	CARBON 1/2W(T) 5% 100Kohm
R287			FA330101	CARBON 1/2W(T) 5% 100ohm
R365			FA330154	CARBON 1/2W(T) 5% 150Kohm
R385			FA330150	CARBON 1/2W(T) 5% 15ohm
R182			FA330102	CARBON 1/2W(T) 5% 1Kohm
R367	R380	R381	FA330105	CARBON 1/2W(T) 5% 1Mohm
R417			FA330229	CARBON 1/2W(T) 5% 2.2ohm
R414			FA330331	CARBON 1/2W(T) 5% 330ohm
R30L			FA330470	CARBON 1/2W(T) 5% 47ohm
R308			FA330561	CARBON 1/2W(T) 5% 560ohm
R101			FA330684	CARBON 1/2W(T) 5% 680Kohm

SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION
R292	R725		FA240101	CARBON 1/4W(T) 5% 100ohm	R224	R30V		FA040302	CARBON 1/8W(T) 5% 3Kohm
R206			FA240103	CARBON 1/4W(T) 5% 10Kohm	R119	R129		FA040472	CARBON 1/8W(T) 5% 4.7Kohm
R10A			FA240113	CARBON 1/4W(T) 5% 11Kohm	R173	R204			
R392			FA240154	CARBON 1/4W(T) 5% 150Kohm	R291	R383			
R220	R240	R260	FA240151	CARBON 1/4W(T) 5% 150ohm	R402	R403			
R163	R30U	R31E	FA240102	CARBON 1/4W(T) 5% 1Kohm	R605	R610	R701		
R609			FA240222	CARBON 1/4W(T) 5% 2.2Kohm	R704	R710	R712		
					R716	R717	R718		
R118			FA240203	CARBON 1/4W(T) 5% 20Kohm	R719	R722	R728		
R393			FA240224	CARBON 1/4W(T) 5% 220Kohm	R729	R730	R733		
R278	R280	R290	FA240223	CARBON 1/4W(T) 5% 22Kohm	R768	R769	R770		
R30X					R739	R740	R771	FA040471	CARBON 1/8W(T) 5% 470ohm
R116			FA240271	CARBON 1/4W(T) 5% 270ohm	JP1	R30P	R359	FA040473	CARBON 1/8W(T) 5% 47Kohm
R30T			FA240332	CARBON 1/4W(T) 5% 3.3Kohm	VR201	VR202			
					R109	R115		FA040470	CARBON 1/8W(T) 5% 47ohm
R104			FA240330	CARBON 1/4W(T) 5% 33 ohm	R294	R295	R390	FA040562	CARBON 1/8W(T) 5% 5.6Kohm
R108	R286		FA240334	CARBON 1/4W(T) 5% 330Kohm	R303			FA040561	CARBON 1/8W(T) 5% 56ohm
R117			FA240390	CARBON 1/4W(T) 5% 39ohm	R386			FA040623	CARBON 1/8W(T) 5% 62Kohm
R343	R350		FA240472	CARBON 1/4W(T) 5% 4.7Kohm					
R30H	R30J		FA240474	CARBON 1/4W(T) 5% 470Kohm					
					R319			FA040683	CARBON 1/8W(T) 5% 68Kohm
R107			FA240564	CARBON 1/4W(T) 5% 560Kohm	R201			FA040680	CARBON 1/8W(T) 5% 68ohm
R126			FA240681	CARBON 1/4W(T) 5% 680ohm	R113	R382		FA040752	CARBON 1/8W(T) 5% 7.5Kohm
R322			FA040122	CARBON 1/8W(T) 5% 1.2Kohm	R212	R232	R252	FA040750	CARBON 1/8W(T) 5% 75ohm
R387			FA040132	CARBON 1/8W(T) 5% 1.3Kohm	R336			FA040822	CARBON 1/8W(T) 5% 8.2Kohm
R205	R338	R708	FA040152	CARBON 1/8W(T) 5% 1.5Kohm					
R714					R284			FA040821	CARBON 1/8W(T) 5% 820ohm
					R150	R157	R175	80002031	FUSEABLE RES 1/2W(A)M 0.22ohm
R703			FA040182	CARBON 1/8W(T) 5% 1.8Kohm	R297			FB910229	FUSIBLE MF RES 1/4W 2.2ohm J
R155	R168	R31C	FA040104	CARBON 1/8W(T) 5% 100Kohm	R310			FB241181	METAL 1/4W(T) 1% 1.18Kohm
R327	R340	R373			R31U			FB241202	METAL 1/4W(T) 1% 12Kohm
R375									
R202	R203	R208	FA040101	CARBON 1/8W(T) 5% 100ohm	R389			FB241372	METAL 1/4W(T) 1% 13.7Kohm
R209	R221	R241			R366			FB241503	METAL 1/4W(T) 1% 150Kohm
R261	R306	R30N			R149			FB241001	METAL 1/4W(T) 1% 1Kohm
R30Y	R31X	R331			R410	R412		FB242501	METAL 1/4W(T) 1% 2.5Kohm
R332	R706	R707			R31R			FB242701	METAL 1/4W(T) 1% 2.7Kohm
R724	R727	R742							
R743	R761	R762			R361			FB242002	METAL 1/4W(T) 1% 20Kohm
R317			FA040106	CARBON 1/8W(T) 5% 10Mohm	R31N			FB242202	METAL 1/4W(T) 1% 22Kohm
					R344			FB242552	METAL 1/4W(T) 1% 25.5Kohm
					R711			FB243481	METAL 1/4W(T) 1% 3.48Kohm
					R31L			FB244532	METAL 1/4W(T) 1% 45.3Kohm

SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION
R110	R122	R161	FA040103	CARBON 1/8W(T) 5% 10Kohm	J26			FB244702	METAL 1/4W(T) 1% 47Kohm
R167	R288	R293			R158			FB240470	METAL 1/4W(T) 1% 47ohm
R307	R30M	R30O			R348			FB245541	METAL 1/4W(T) 1% 5.54Kohm
R310	R318	R330			R388			FB245490	METAL 1/4W(T) 1% 549ohm
R345	R360	R368			R349			FB245602	METAL 1/4W(T) 1% 56Kohm
R369	R377	R379							
R601	R604	R612			R151			FB246242	METAL 1/4W(T) 1% 62.4Kohm
R613	R709	R720			R210	R230	R250	FB247509	METAL 1/4W(T) 1% 75ohm
R736					R411	R413		FB248201	METAL 1/4W(T) 1% 8.2Kohm
					R31T			FB249312	METAL 1/4W(T) 1% 93.1Kohm
R353			FA040154	CARBON 1/8W(T) 5% 150Kohm	R169	R313	R314	FB910010	METAL 1/4W(T) 5% 1ohm
R154	R357		FA040153	CARBON 1/8W(T) 5% 15Kohm	R351				
R362			FA040150	CARBON 1/8W(T) 5% 15ohm					
R112	R123	R132	FA040102	CARBON 1/8W(T) 5% 1Kohm	R415			FB470119	MOF 1W/M(A) 5% 1.1ohm
R289	R301	R401			R128	R606		FB470100	MOF 1W/M(A) 5% 10ohm
R603					R160			FB470153	MOF 1W/M(A) 5% 15Kohm
R159	R296	R315	FA040105	CARBON 1/8W(T) 5% 1Mohm	R421			FB470109	MOF 1W/M(A) 5% 1ohm
R395					R312			FB470270	MOF 1W/M(A) 5% 27ohm
R608			FA040222	CARBON 1/8W(T) 5% 2.2Kohm	R422			FB470339	MOF 1W/M(A) 5% 3.3ohm
R305			FA040225	CARBON 1/8W(T) 5% 2.2Mohm	R103			FB470680	MOF 1W/M(A) 5% 68ohm
R374			FA040204	CARBON 1/8W(T) 5% 200Kohm	R31A			FB480100	MOF 1W/M(B) 5% 10ohm
R223	R243	R263	FA040224	CARBON 1/8W(T) 5% 220Kohm	R105			FB560248	MOF 2W/M(A) 5% 0.24ohm
R30C	R30E	R339			R354			FB560182	MOF 2W/M(A) 5% 1.8Kohm
R270			FA040221	CARBON 1/8W(T) 5% 220ohm					
					R125			FB560103	MOF 2W/M(A) 5% 10Kohm
R127	R130	R611	FA040223	CARBON 1/8W(T) 5% 22Kohm	R335			FB560151	MOF 2W/M(A) 5% 150ohm
R726					R302			FB560222	MOF 2W/M(A) 5% 2.2Kohm
R30G			FA040220	CARBON 1/8W(T) 5% 22ohm	R316			FB560331	MOF 2W/M(A) 5% 330ohm
R363			FA040244	CARBON 1/8W(T) 5% 240Kohm	R106			FB570563	MOF 2W/M(B) 5% 56Kohm
R364			FA040274	CARBON 1/8W(T) 5% 270Kohm					
R244	R264		FA040202	CARBON 1/8W(T) 5% 2Kohm					
					R309			FB710150	MOF 3W/M(A) 5% 15ohm
R31P	R731		FA040332	CARBON 1/8W(T) 5% 3.3Kohm	R311			FB710109	MOF 3W/M(A) 5% 1ohm
R358			FA040334	CARBON 1/8W(T) 5% 330Kohm	R304			80011181	RESISTOR FUSEABLE 1/2W/A(M) 22ohm
R102	R31H	R31J	FA040331	CARBON 1/8W(T) 5% 330ohm					
R715	R721				R394			FC030508	WOUND RES 1W/(A) 5% 0.5ohm
R219	R239	R259	FA040333	CARBON 1/8W(T) 5% 33Kohm	R111			FC110158	WOUND RES 2W/(A) 5% 0.15ohm
R328									
R211	R231	R251	FA040330	CARBON 1/8W(T) 5% 33ohm					
R213	R233	R253	FA040391	CARBON 1/8W(T) 5% 390ohm					
R713			FA040393	CARBON 1/8W(T) 5% 39Kohm					

SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION
C707	C708		GB610152	CERAMIC SL/T 100P/50V J	*** CAPACITORS ***				
C353			GB633152	CERAMIC SL/T 330P/50V J					
C705	C706		GB633052	CERAMIC SL/T 33P/50V J					
SG301			80011281	CERAMIC SPARK CAPS 1KV +1500V-900V					
C276	C357		GB7102H3	CERAMIC Y5P(B)/T 1000P/1KV K					

SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION
C275	C278	C287	GB7102F3	CERAMIC Y5P(B)/T 1000P/500V K	C307			GFD47482	PLASTIC MPPS/A 0.47u/250V J(MYLAR)
C297					C271	C347	C401	GE210252	PLASTIC PEI/T 0.001u/50V J
C605			GB710253	CERAMIC Y5P(B)/T 1000P/50V K	C40A	C413		GE222252	PLASTIC PEI/T 0.0022u/50V J
C127			GB7101H3	CERAMIC Y5P(B)/T 100P/1KV K	C111	C320	C407	GE233252	PLASTIC PEI/T 0.0033u/50V J
C334			GB7152H3	CERAMIC Y5P(B)/T 1500P/1KV K					
C124	C304		GB7331H3	CERAMIC Y5P(B)/T 330P/1KV K	C601			GE268252	PLASTIC PEI/T 0.0068u/50V J
					C128	C142	C295	GE210352	PLASTIC PEI/T 0.01u/50V J
C272	C341		GB7471F3	CERAMIC Y5P(B)/T 470P/500V K	C296	C327	C363		
C110			GB747153	CERAMIC Y5P(B)/T 470P/50V K	C603				
C204	C205	C267	GB210458	CERAMIC Y5V/T 0.1u/50V Z	C123	C348		GE222352	PLASTIC PEI/T 0.022u/50V J
C282	C283	C284			C316	C343	C364	GE247352	PLASTIC PEI/T 0.047u/50V J
C346	C350	C702			C306	C317	C328	GE210452	PLASTIC PEI/T 0.1u/50V J
C709					C358	C361			
C106			GB8103F5	CERAMIC Z5U(E)/T 0.01u/500V M	C319			GED562M2	PLASTIC PPN/A 5600P/800V J
C321			GB9103H8	CERAMIC Z5V(F)/T 0.01u/1KV Z	C318			GFC622J2	PLASTIC PPS/A 6200P/2KV J
					C105			GKA227E5	POWER ELECT 85oC 220u/400V M
C310	C331		GB9103F8	CERAMIC Z5V(F)/T 0.01u/500V Z	C101			GJ047400	SAFETY X-CAP 0.47u/275V M
C112	C149	C201	GB910358	CERAMIC Z5V(F)/T 0.01u/50V Z	C102			GJC102E5	SAFETY Y-CAP/D 1000P/400V M
C202	C203	C207							
C231	C270	C280							
C281	C291	C294							
C299	C301	C409			C103	C104	C146	GJH102E5	SAFETY Y-CAP/S 1000P/400V M
C712	C724				C154				
C277			GB9332H8	CERAMIC Z5V(F)/T 3300P/1KV Z					
C120	C138		GA110775	ELECT 105oC/A 100u/100V M TK					
C214	C234	C254	GA210575	ELECT 105oC/T 1u/100V M					
C288			GAB22675	ELECT 105oC/T 22u/100V M					
C428			GA347485	ELECT 85oC/T 0.47u/250V M					
C122			GA310815	ELECT 85oC/T 1000u/10V M					
C372	C703		GA310725	ELECT 85oC/T 100u/16V M					
C308	C410		GA310745	ELECT 85oC/T 100u/35V M					
C113	C116	C143	GA310655	ELECT 85oC/T 10u/50V M					
C150	C206	C210							
C230	C250	C292							
C293	C337	C338							
C604	C711	C726							
C727	C728								
C336	C340	C352	GA310555	ELECT 85oC/T 1u/50V M					
C701	C710								
C339	C704		GA322555	ELECT 85oC/T 2.2u/50V M					

SYMBOL			PART NO	DESCRIPTION
C209			GA322725	ELECT 85oC/T 220u/16V M
C109			GA322645	ELECT 85oC/T 22u/35V M
C311			GA322655	ELECT 85oC/T 22u/50V M
C344			GA347585	ELECT 85oC/T 4.7u/250V M
C309			GA347555	ELECT 85oC/T 4.7u/50V M
C136	C330		GA347725	ELECT 85oC/T 470u/16V M
C108	C137	C151	GA347625	ELECT 85oC/T 47u/16V M
C285	C289	C335		
C725				
C368			GA347635	ELECT 85oC/T 47u/25V M
C354			GA347645	ELECT 85oC/T 47u/35V M
C313			GA347655	ELECT 85oC/T 47u/50V M
C121	C408		GAH10825	ELECT CAP 105oC/T 1000u/16V M TK
C119			GAH22675	ELECT CAP 105oC/T 22u/100V M TK
C156			GAH47555	ELECT CAP 105oC/T 4.7u/50V M TK
C139	C404		GAH47725	ELECT CAP 105oC/T 470u/16V M TK
C213	C233	C253	GA410575	ELECT NP/T 1u/100V M
C312			GF215252	MEF CAP BOX 0.0015u/50V J
C315			GF210252	MEF CAP BOX 0.001u/50V J
C115			GF233262	MEF CAP BOX 0.0033u/63V J
C366			GF256252	MEF CAP BOX 0.0056u/50V J
C362			GF282252	MEF CAP BOX 0.0082u/50V J
C365			GF210352	MEF CAP BOX 0.01u/50V J
C360			GF215452	MEF CAP BOX 0.15u/50V J
C314			GF210452	MEF CAP BOX 0.1u/50V J
C114			GF210462	MEF CAP BOX 0.1u/63V J
C403			GF222452	MEF CAP BOX 0.22u/50V J
C345			GFA10382	PLASTIC MPE/A 0.01u/250V J
C329			GFA15482	PLASTIC MPE/A 0.15u/250V J
C333			GFA10582	PLASTIC MPE/A 1u/250V J
C351			GFB15482	PLASTIC MPP/A 0.15u/250V J
C356			GFB30482	PLASTIC MPP/A 0.3u/250V J
C325			GFB47482	PLASTIC MPP/A 0.47u/250V J
C355			GFB75482	PLASTIC MPP/A 0.75u/250V J
C332			GFD334E2	PLASTIC MPPS/A 0.33U/400V (PILKOR)

The components specified for Model AS75F-3 SAMSUNG CRT.

Note: The components identified by  make are critical for safety.

Replace only with parts Number specified.

SYMBOL	PART NO	DESCRIPTION
*** CRT & TUNER ***		
CRT	80013481	CRT 17" SAMSUNG M41OCJ761X172 DFX
*** ICS ***		
U702	80009941	ATMEL E ² ROM AT24C08B
U101	DD002600	IC LINEAR KA3842A 8P
U201	80000631	IC LM1281
U103	80000321	IC PHOTO COUPLE PS2561, TLP721F
O103	80003831	IC REGULATOR TL431 817B 4P
U401	80001041	IC TDA8172 (N.S,SGS)
U203	80003661	N.S VIDEO DRIVE IC LM2438
U701	80013001	N0701-2 VE MASK MCU
U301	80010251	OP AMP LM358 / KIA358
U204	80015661	OSD IC MTV016N (V2)
U302	80012941	PHILIPS IC TDA 4857
*** TRANSISTOR ***		
O101	EF202500	FET N 2SK2545 TO-220F TOSHIBA
O313	EF206301	FET N YTA630 TO-220F
O308	EFA29610	TR 2SK2961 FET TOSHIBA
Q201	EAA12133	TR NPN 2SC1213AC TO-92(T)
O105	O107	O110
O113	O302	O306
O320	O323	O324
O401	O601	O603
O605	O606	
O303	EAA40020	TR NPN 2SC4002 TO-92(T) (SANYO)
O307	80005721	TR NPN 2SC5411(hfe) TO-3P
O321	EAA09456	TR NPN 2SC945P TO-92(T) (N.P.S.)
O318	80008141	TR NPN 2SD1763 TO-220F
O304	EAA04220	TR NPN BF422 TO-92(T) (T.P)
O106	EAA23281	TR NPN KSC 2328A TO-92 (T) (SAMSUNG)
O301	EAA23690	TR NPN PH2369 TO-92(T) (PHILIPS)
O310	O604	TR PNP 2SA1015GR TO-92(T) (T.P.S.)
O325	O326	O701
O702	O703	
O112	O305	TR PNP BF423 TO-92(T)(T.P.)
O108	O317	TR PNP KSA 928A TO-92(T)(SAMSUNG)
O104	EB307720	TR PNP KSB772 TO-126

SYMBOL	PART NO	DESCRIPTION
ZD102	EKA01201	ZEN DIODE 1/2W(T) HZS12A2(HITACHI)
ZD303	EKA00507	ZEN DIODE 1/2W(T) HZS5C2 (HITACHI)
ZD703		
ZD706	EKA00607	ZEN DIODE 1/2W(T) HZS6C2 (HITACHI)
*** TRANSFORMERS ***		
T301	80009281	17" N0701F FBT
T302	80000281	H.DRIVE X'FM 4.5mH EI-19
T303	80015651	N0701F D.F. X'FM EI-19(1:10)
T101	80011211	POWER X'FM ERL35 500uH FE700+
*** VARIABLE RESISTORS ***		
VR101	FF300201	VR CARBON 6mm 200 ohm/B
VR210	FF300203	VR CARBON 6mm 20K/B
VR307	FF310104	VR CARBON 6mm 100K
*** RELAYS & SWITCHES ***		
RL101	80003751	RELAY 12V 6P GSA-SS-212DM(GOOD-SKY)
RL301	80010001	RELAY RUDH-SH-112D400ohm(GOOD SKY)
SW101	80012411	SW POWER30V/0.3A JPS1258DS(Favortron)
SW701	80000251	TACT SW 1P 100G+50
SW301	80010621	WAFFER 2Lx3P 2.54mm
*** COILS & FILTERS ***		
L201	L202	HB000008
L303	L304	80001811
L103		80003681
G2,G4 WIRE		HA030010
L301		80009291
L101		80000111
L102		HB000015
L302		80011061
L307		80010401
L203	L204	L205
		HB013159
J23		HB013100
*** PWB ASSYS ***		
	7C0215MS	CRT BOARD ASSY
	7M0216MS	MAIN BOARD ASSY
*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***		
SOCKET	80001751	17" 29D NECK CRT SOCKET
DEGUSSING COIL	80010551	17" N0701F MPRII DEGAUSSING
P101	JD512001	AC SOCKET 3P
F101	80001521	FUSE 3.15A/250V 50T T3.15A
FOR U701	JD010040	IC SOCKET 40P

SYMBOL	PART NO	DESCRIPTION
*** DIODES ***		
D107	D109	D10A
D117	D119	D125
D126	D127	D129
D202	D203	D204
D205	D210	D211
D230	D231	D250
D251	D302	D304
D311	D313	D314
D315	D317	D319
D320	D323	D325
D327	D332	D333
D334	D336	D337
D340	D344	D601
D602	D604	D605
D60A	D703	D704
D705		
D112	D113	D118
D110	D335	
D308		
D305	D306	D702
D101	D102	D103
D104		
D111		
D307		
D316		
D213	D214	D233
D234	D253	D254
D106	D108	D131
D303	D310	D345
D701		
D201	D301	D312
D318	D321	D322
D324	D328	D329
D330	D331	D341
D403		
D105	D116	D326
LED701		
ZD104		
ZD101		
EJ044148		DIODE "T" 1N4148
EJB20001		DIODE/A 3A 1N5406
80011291		DIODE/A 3A/400V RG4()
80001171		DIODE/A 5TUZ47C (TOSHIBA)
80009261		DIODE/A RP3F(A+K) SANKEN
80000451		DIODE/T 1/2W 1SS83
EJAC0017		DIODE/T 1A 1N4936
EJAC0018		DIODE/T 1A 1N4937
EJA20003		DIODE/T 1A BA159
80000131		LED L-59GH/1GYC
EKA00603		ZEN DIODE 1/2W(T) 6B1 (HITACHI)
EKA0180B		ZEN DIODE 1/2W(T) HZS 18-2(HITACHI)

SYMBOL	PART NO	DESCRIPTION
POWER CORD	80001631	POWER CORD 3P1.8 NON-SHIELDCOLORSG8508
CABLE	80012051	SIGNAL CABLE 20276 1.5M FOR PC+5V
TH101	80000801	THERMISTOR NTCR SCK054 13.3mm
TH102	80005821	THERMISTOR PTCR 4.5ohm
X701	EM012004	XTAL 49U 12MHz
*** APPEARANCE PARTS ***		
	10100594	CABINET BACK
	10101341	CABINET FRONT
	10101332	CABINET FRONT ASSY
	17000301	CUSHION PIECE(BACK)
	17000291	CUSHION SHEET
	17000451	CUSHION SHEET
	11000331	REVOLVING STAND ASSY
	11000251	REVOLVING STAND(B)(94HB)
	11000361	REVOLVING STAND(B)(94HB)
	11000362	REVOLVING STAND(B)(94HB)
	11000261	REVOLVING STAND(T)(94HB)
	11000262	REVOLVING STAND(T)(94HB)
*** PRINTED & PACKING MATERIALS ***		
B/C LABEL	13201101	CARTON BOX (AS75F-1)
	15000971	NAME PLATE INSTRUCTION (AS75F-1)
	15500712	OWNERS MANUAL (AS75F-3)
	13400521	POLY(LON)(B)CARTON
	13400511	POLY(LON)(T)CARTON
*** RESISTORS ***		
R156		FA330159
R325		FA330182
R114	R120	FA330104
R287		FA330101
R365		FA330154
R385		FA330150
R182		FA330102
R367	R380	FA330105
R417		FA330229
R414		FA330331
R30L		FA330470
R308		FA330561
R101		FA330684
		CARBON 1/2W(T) 5% 1.5ohm
		CARBON 1/2W(T) 5% 1.8Kohm
		CARBON 1/2W(T) 5% 100Kohm
		CARBON 1/2W(T) 5% 100ohm
		CARBON 1/2W(T) 5% 150Kohm
		CARBON 1/2W(T) 5% 15ohm
		CARBON 1/2W(T) 5% 1Kohm
		CARBON 1/2W(T) 5% 1Mohm
		CARBON 1/2W(T) 5% 2.2ohm
		CARBON 1/2W(T) 5% 330ohm
		CARBON 1/2W(T) 5% 47ohm
		CARBON 1/2W(T) 5% 560ohm
		CARBON 1/2W(T) 5% 680Kohm

SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION
R292	R725		FA240101	CARBON 1/4W(T) 5% 100ohm	R211	R231	R251	FA040330	CARBON 1/8W(T) 5% 33ohm
R206			FA240103	CARBON 1/4W(T) 5% 10Kohm	R213	R233	R253	FA040391	CARBON 1/8W(T) 5% 390ohm
R10A		R31F	FA240113	CARBON 1/4W(T) 5% 11Kohm	R713			FA040393	CARBON 1/8W(T) 5% 39Kohm
R392			FA240154	CARBON 1/4W(T) 5% 150Kohm	R224	R30V		FA040302	CARBON 1/8W(T) 5% 3Kohm
R220	R240	R260	FA240151	CARBON 1/4W(T) 5% 150ohm	R119	R129	R148	FA040472	CARBON 1/8W(T) 5% 4.7Kohm
R163	R30U	R31E	FA240102	CARBON 1/4W(T) 5% 1Kohm	R173	R204	R282		
R609			FA240222	CARBON 1/4W(T) 5% 2.2Kohm	R291	R383	R391		
					R402	R403	R602		
R118			FA240203	CARBON 1/4W(T) 5% 20Kohm	R605	R610	R701		
R393			FA240224	CARBON 1/4W(T) 5% 220Kohm	R704	R710	R712		
R278	R280	R290	FA240223	CARBON 1/4W(T) 5% 22Kohm	R716	R717	R718		
R30X					R719	R722	R728		
R116			FA240271	CARBON 1/4W(T) 5% 270ohm	R729	R730	R733		
R30T			FA240332	CARBON 1/4W(T) 5% 3.3Kohm	R768	R769	R770		
					R739	R740	R771	FA040471	CARBON 1/8W(T) 5% 470ohm
R104			FA240330	CARBON 1/4W(T) 5% 33 ohm	JP1	R30P	R359	FA040473	CARBON 1/8W(T) 5% 47Kohm
R108	R286		FA240334	CARBON 1/4W(T) 5% 330Kohm	VR201	VR202			
R117			FA240390	CARBON 1/4W(T) 5% 39ohm	R109	R115		FA040470	CARBON 1/8W(T) 5% 47ohm
R343	R350		FA240472	CARBON 1/4W(T) 5% 4.7Kohm	R294	R295	R390	FA040562	CARBON 1/8W(T) 5% 5.6Kohm
R107			FA240564	CARBON 1/4W(T) 5% 560Kohm	R303			FA040561	CARBON 1/8W(T) 5% 560ohm
					R386			FA040623	CARBON 1/8W(T) 5% 62Kohm
R126			FA240681	CARBON 1/4W(T) 5% 680ohm	R201			FA040680	CARBON 1/8W(T) 5% 68ohm
R30H	R30J		FA240754	CARBON 1/4W(T) 5% 750Kohm	R113	R382		FA040752	CARBON 1/8W(T) 5% 7.5Kohm
R322			FA040122	CARBON 1/8W(T) 5% 1.2Kohm	R212	R232	R252	FA040750	CARBON 1/8W(T) 5% 75ohm
R387			FA040132	CARBON 1/8W(T) 5% 1.3Kohm	R336			FA040822	CARBON 1/8W(T) 5% 8.2Kohm
R205	R338	R708	FA040152	CARBON 1/8W(T) 5% 1.5Kohm					
R714					R284			FA040821	CARBON 1/8W(T) 5% 820ohm
					R150	R157	R175	80002031	FUSEABLE RES 1/2W(A)M 0.22ohm
R703			FA040182	CARBON 1/8W(T) 5% 1.8Kohm	R297			FB910229	FUSIBLE MF RES 1/4W 2.2ohm J
R155	R168	R31C	FA040104	CARBON 1/8W(T) 5% 100Kohm	R31O			FB241181	METAL 1/4W(T) 1% 1.18Kohm
R377	R340	R373			R31T			FB241073	METAL 1/4W(T) 1% 107Kohm
R375									
R202	R203	R208	FA040101	CARBON 1/8W(T) 5% 100ohm	R31U			FB241202	METAL 1/4W(T) 1% 12Kohm
R209	R221	R241			R389			FB241372	METAL 1/4W(T) 1% 13.7Kohm
R261	R306	R30N			R366			FB241693	METAL 1/4W(T) 1% 169Kohm
R30Y	R31X	R331			R149			FB241001	METAL 1/4W(T) 1% 1Kohm
R332	R706	R707			R410	R412		FB242501	METAL 1/4W(T) 1% 2.5Kohm
R724	R727	R742							
R743	R761	R762			R31R			FB242701	METAL 1/4W(T) 1% 2.7Kohm
					R361			FB242002	METAL 1/4W(T) 1% 20Kohm

SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION
R110	R122	R161	FA040103	CARBON 1/8W(T) 5% 10Kohm	R31N			FB242202	METAL 1/4W(T) 1% 22Kohm
R167	R288	R293			R344			FB242552	METAL 1/4W(T) 1% 25.5Kohm
R307	R30M	R30O			R711			FB243481	METAL 1/4W(T) 1% 3.48Kohm
R310	R318	R330							
R345	R360	R368			R388			FB244300	METAL 1/4W(T) 1% 430ohm
R369	R377	R379			J26			FB244702	METAL 1/4W(T) 1% 47Kohm
R601	R604	R612			R158			FB240470	METAL 1/4W(T) 1% 47ohm
R613	R709	R720			R348			FB245541	METAL 1/4W(T) 1% 5.54Kohm
R736					R31L			FB245102	METAL 1/4W(T) 1% 51Kohm
R317			FA040106	CARBON 1/8W(T) 5% 10Mohm					
					R349			FB245602	METAL 1/4W(T) 1% 56Kohm
R319			FA040124	CARBON 1/8W(T) 5% 120Kohm	R151			FB246242	METAL 1/4W(T) 1% 62.4Kohm
R353			FA040154	CARBON 1/8W(T) 5% 150Kohm	R210	R230	R250	FB247509	METAL 1/4W(T) 1% 75ohm
R154	R357		FA040153	CARBON 1/8W(T) 5% 15Kohm	R411	R413		FB248201	METAL 1/4W(T) 1% 8.2Kohm
R362			FA040150	CARBON 1/8W(T) 5% 15ohm	R169	R313	R314	FB910010	METAL 1/4W(T) 5% 1ohm
R112	R123	R132	FA040102	CARBON 1/8W(T) 5% 1Kohm	R351				
R289	R301	R401							
R603									
					R415			FB470129	MOF 1W/M(A) 5% 1.2ohm
R159	R296	R315	FA040105	CARBON 1/8W(T) 5% 1Mohm	R128	R606		FB470100	MOF 1W/M(A) 5% 10ohm
R395					R160			FB470153	MOF 1W/M(A) 5% 15Kohm
R608	R708		FA040222	CARBON 1/8W(T) 5% 2.2Kohm	R421			FB470109	MOF 1W/M(A) 5% 1ohm
R305			FA040225	CARBON 1/8W(T) 5% 2.2Mohm	R312			FB470270	MOF 1W/M(A) 5% 27ohm
R374			FA040204	CARBON 1/8W(T) 5% 200Kohm					
R223	R243	R263	FA040224	CARBON 1/8W(T) 5% 220Kohm	R422			FB470339	MOF 1W/M(A) 5% 3.3ohm
R30C	R30E	R339			R103			FB470680	MOF 1W/M(A) 5% 68ohm
					R31A			FB480100	MOF 1W/M(B) 5% 10ohm
					R105			FB560248	MOF 2W/M(A) 5% 0.24ohm
R270			FA040221	CARBON 1/8W(T) 5% 220ohm	R354			FB560182	MOF 2W/M(A) 5% 1.8Kohm
R127	R130	R611	FA040223	CARBON 1/8W(T) 5% 22Kohm					
R726									
R30G			FA040220	CARBON 1/8W(T) 5% 22ohm	R125			FB560103	MOF 2W/M(A) 5% 10Kohm
R363			FA040244	CARBON 1/8W(T) 5% 240Kohm	R335			FB560151	MOF 2W/M(A) 5% 150ohm
R364			FA040274	CARBON 1/8W(T) 5% 270Kohm	R302			FB560222	MOF 2W/M(A) 5% 2.2Kohm
					R316			FB560331	MOF 2W/M(A) 5% 330ohm
					R106			FB570563	MOF 2W/M(B) 5% 56Kohm
R244	R264		FA040202	CARBON 1/8W(T) 5% 2Kohm					
R31P	R731		FA040332	CARBON 1/8W(T) 5% 3.3Kohm	R309			FB710150	MOF 3W/M(A) 5% 15ohm
R358			FA040334	CARBON 1/8W(T) 5% 330Kohm	R311			FB710109	MOF 3W/M(A) 5% 1ohm
R102	R31H	R31J	FA040331	CARBON 1/8W(T) 5% 330ohm	R304			80011181	RESISTOR FUSEABLE 1/2W(A)M) 22ohm
R715	R721								
R219	R239	R259	FA040333	CARBON 1/8W(T) 5% 33Kohm	R394			FC030508	WOUND RES 1W(A) 5% 0.5ohm
R328					R111			FC110158	WOUND RES 2W(A) 5% 0.15ohm

*** CAPACITORS ***			
C707	C708	GB610152	CERAMIC SL/T 100P/50V J

SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION								
C353	C706	C357	GB633152	CERAMIC SL/T 330P/50V J	C355	C307		GFB75482	PLASTIC MPP/A 0.75u/250V J								
C705			GB633052	CERAMIC SL/T 33P/50V J	C332			GFD334E2	PLASTIC MPPI/A 0.33u/400V (PILKOR)								
SG301			80011281	CERAMIC SPARK CAPS 1KV +1500V-900V													
C276			GB7102H3	CERAMIC Y5P(B)/T 1000P/1KV K	GFD47482			PLASTIC MPPI/A 0.47u/250V J (MYLAR)									
C275	C278	C287	GB7102F3	CERAMIC Y5P(B)/T 1000P/500V K	C271	C347	C401	GE210252	PLASTIC PEI/T 0.001u/50V J								
C297					C40A			GE222252	PLASTIC PEI/T 0.0022u/50V J								
C605			GB710253	CERAMIC Y5P(B)/T 1000P/50V K	C111			GE233252	PLASTIC PEI/T 0.0033u/50V J								
C127			GB7101H3	CERAMIC Y5P(B)/T 100P/1KV K	C601			GE268252	PLASTIC PEI/T 0.0068u/50V J								
C124	C304	C341	GB7331H3	CERAMIC Y5P(B)/T 330P/1KV K	C128	C142	C295	GE210352	PLASTIC PEI/T 0.01u/50V J								
C272			GB7471F3	CERAMIC Y5P(B)/T 470P/500V K													
C110	C205	C267	GB747153	CERAMIC Y5P(B)/T 470P/50V K						C296	C327	C363	GE222352	PLASTIC PEI/T 0.022u/50V J			
C204			GB210458	CERAMIC Y5V/T 0.1u/50V Z						C123					C348	C364	GE247352
C282			C283	C284	C316	C343	C364	GE210452	PLASTIC PEI/T 0.1u/50V J								
C346			C350	C702	C306	C317	C328			C358							
C709			C319														
C106	C331	C201	GB8103F5	CERAMIC Z5U(E)/T 0.01u/500V M	C318	C104	C146			GFC622J2	PLASTIC PPS/A 6200P/2KV J						
C321			GB9103H8	CERAMIC Z5V(F)/T 0.01u/1KV Z	C105			GKA227E5	POWER ELECT 85oC 220u/400V M								
C310			GB9103F8	CERAMIC Z5V(F)/T 0.01u/500V Z	C101			GJ047400	SAFETY X-CAP 0.47u/275V M								
C112			C149	C207	GB910358			CERAMIC Z5V(F)/T 0.01u/50V Z	C102	GJC102E5	SAFETY Y-CAP/D 1000P/400V M						
C202	C203	C280			C103	C104	C146	GJH102E5	SAFETY Y-CAP/S 1000P/400V M								
C231			C270	C294	C154												
C281			C291	C409													
C299			C301														
C712	C234	C254	C724														
C277			GB9332H8	CERAMIC Z5V(F)/T 3300P/1KV Z													
C120			GA110775	ELECT 105oC/A 100u/100V M TK													
C214			GA210575	ELECT 105oC/T 1u/100V M													
C288			GAB22675	ELECT 105oC/T 22u/100V M													
C428	C703	C143	GA347485	ELECT 85oC/T 0.47u/250V M													
C122			GA310815	ELECT 85oC/T 1000u/10V M													
C372			GA310725	ELECT 85oC/T 100u/16V M													
C308			GA310745	ELECT 85oC/T 100u/35V M													
C113	C116	C210	GA310655	ELECT 85oC/T 10u/50V M													
C150	C206	C292															
C230	C250	C338															
C293	C337	C726															
C604	C711																
C727	C728																

SYMBOL			PART NO	DESCRIPTION
C336	C340	C352	GA310555	ELECT 85oC/T 1u/50V M
C701	C710			
C339	C704		GA322555	ELECT 85oC/T 2.2u/50V M
C209			GA322725	ELECT 85oC/T 220u/16V M
C109			GA322645	ELECT 85oC/T 22u/35V M
C311			GA322655	ELECT 85oC/T 22u/50V M
C344			GA347585	ELECT 85oC/T 4.7u/250V M
C309			GA347555	ELECT 85oC/T 4.7u/50V M
C136	C330		GA347725	ELECT 85oC/T 470u/16V M
C108	C137	C151	GA347625	ELECT 85oC/T 47u/16V M
C285	C289		C335	
C725				
C368				GA347635
C354			GA347645	ELECT 85oC/T 47u/35V M
C313	C408		GA347655	ELECT 85oC/T 47u/50V M
C121		GAH10825	ELECT CAP 105oC/T 1000u/16V M TK	
C119		GAH22675	ELECT CAP 105oC/T 22u/100V M TK	
C156		GAH47555	ELECT CAP 105oC/T 4.7u/50V M TK	
C139	C404		GAH47725	ELECT CAP 105oC/T 470u/16V M TK
C213	C233	C253	GA410575	ELECT NP/T 1u/100V M
C312			GF215252	MEF CAP BOX 0.0015u/50V J
C315			GF210252	MEF CAP BOX 0.001u/50V J
C115			GF233262	MEF CAP BOX 0.0033u/63V J
C366			GF256252	MEF CAP BOX 0.0056u/50V J
C362			GF282252	MEF CAP BOX 0.0082u/50V J
C365			GF210352	MEF CAP BOX 0.01u/50V J
C360			GF215452	MEF CAP BOX 0.15u/50V J
C314			GF210452	MEF CAP BOX 0.1u/50V J
C114			GF210462	MEF CAP BOX 0.1u/63V J
C403			GF222452	MEF CAP BOX 0.22u/50V J
C345			GFA22382	PLASTIC MPE/A 0.022u/250V J
C329			GFA15482	PLASTIC MPE/A 0.15u/250V J
C333			GFA10582	PLASTIC MPE/A 1u/250V J
C351			GFB15482	PLASTIC MPP/A 0.15u/250V J
C356			GFB30482	PLASTIC MPP/A 0.3u/250V J
C325			GFB47482	PLASTIC MPP/A 0.47u/250V J

The components specified for Model AS75F-3 LG CRT.

Note: The components identified by  make are critical for safety.

Replace only with parts Number specified.

SYMBOL	PART NO	DESCRIPTION
*** CRT & TUNER ***	***	***
CRT	80013321	CRT 17" LG M41QEE903X04
*** ICS ***	***	***
U702	80009941	ATMEL E ² ROM AT24C08B
U101	DD002600	IC LINEAR KA3842A 8P
U201	80000631	IC LM1281
U103	80000321	IC PHOTO COUPLE PS2561, TLP721F
O103	80003831	IC REGULATOR TL431 817B 4P
U401	80001041	IC TDA8172 (N.S,SGS)
U203	80003661	N.S VIDEO DRIVE IC LM2438
U701	80013001	N0701-2 VE MASK MCU
U301	80010251	OP AMP LM358 / KIA358
U204	80015661	OSD IC MTV016N (V2)
U302	80012941	PHILIPS IC TDA 4857
*** TRANSISTOR ***	***	***
O101	EF202500	FET N 2SK2545 TO-220F TOSHIBA
O313	EF206301	FET N YTA630 TO-220F
O308	EFA29610	TR 2SK2961 FET TOSHIBA
Q201	EAA12133	TR NPN 2SC1213AC TO-92(T)
O105	O107	O110
O113	O302	O306
O320	O323	O324
O401	O601	O603
O605	O606	
O303	EAA40020	TR NPN 2SC4002 TO-92(T) (SANYO)
O307	80005721	TR NPN 2SC5411(hfe) TO-3P
O321	EAA09456	TR NPN 2SC945P TO-92(T) (N.P.S.)
O318	80008141	TR NPN 2SD1763 TO-220F
O304	EAA04220	TR NPN BF422 TO-92(T) (T.P)
O106	EAA23281	TR NPN KSC 2328A TO-92(T) (SAMSUNG)
O301	EAA23690	TR NPN PH2369 TO-92(T) (PHILIPS)
O310	O604	O701
O325	O326	O701
O702	O703	
O112	O305	
O108	O317	
O104	EBA09281	TR PNP KSA 928A TO-92(T)(SAMSUNG)
	EB307720	TR PNP KSB772 TO-126

SYMBOL	PART NO	DESCRIPTION
ZD102	EKA01201	ZEN DIODE 1/2W(T) HZS12A2(HITACHI)
ZD303	EKA00507	ZEN DIODE 1/2W(T) HZS5C2 (HITACHI)
ZD703		
ZD704		
ZD706	EKA00607	ZEN DIODE 1/2W(T) HZS5C2 (HITACHI)
*** TRANSFORMERS ***	***	***
T301	80009281	17" N0701F FBT
T302	80000281	H.DRIVE X'FM 4.5mH EI-19
T303	80013361	N1701F D.F X'FM EI-19(L:9)
T101	80011211	POWER X'FM ERL35 500uH FE700+
*** VARIABLE RESISTORS ***	***	***
VR101	FF300201	VR CARBON 6mm 200 ohm/B
VR210	FF300203	VR CARBON 6mm 20K/B
VR307	FF310104	VR CARBON 6mm 100K
*** RELAYS & SWITCHES ***	***	***
RL101	80003751	RELAY 12V 6P GSA-SS-212DM(GOOD-SKY)
RL301	80010001	RELAY RUDH-SH-112D400ohm(GOOD SKY)
SW101	80012411	SW POWER 30V/0.3A JPS1258DS(Favortron)
SW701	80000251	TACT SW 1P 100G+ 50
SW301	80010621	WAFFER 2Lx3P 2.54mm
*** COILS & FILTERS ***	***	***
L201	L202	HB000008
L303	L304	80001811
L103		80003681
G2,G4 WIRE		HA030010
L301		80009291
L101		80000111
L102		HB000015
L302		80015151
L307		80010401
L203	L204	L205
		HB013159
J23		HB013100
*** PWB ASSYS ***	***	***
	7C0215ML	CRT BOARD ASSY
	7M0216ML	MAIN BOARD ASSY
*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***	***	***
SOCKET	80001751	17" 29D NECK CRT SOCKET
DEGAUSSING COIL	80010551	17" N0701F MPRII DEGAUSSING
P101	JD512001	AC SOCKET 3P
F101	80001521	FUSE 3.15A/250V 50T T3.15A
FOR U701	JD010040	IC SOCKET 40P

SYMBOL	PART NO	DESCRIPTION
*** DIODES ***	***	***
D107	D109	D10A
D117	D119	D125
D126	D127	D129
D202	D203	D204
D205	D210	D211
D230	D231	D250
D251	D302	D304
D311	D313	D314
D315	D317	D319
D320	D323	D325
D327	D332	D333
D334	D336	D337
D340	D344	D601
D602	D604	D605
D60A	D703	D704
D705		
D112	D113	D118
D110	D335	
D308		
D305	D306	D702
D101	D102	D103
D104		
D111		
D307		
D316		
D213	D214	D233
D234	D253	D254
D106	D108	D131
D303	D310	D345
D701		
D201	D301	D312
D318	D321	D322
D324	D328	D329
D330	D331	D341
D403		
D105	D116	D326
LED701		
ZD104		
ZD101		
EJ044148		DIODE "T" 1N4148
EJB20001		DIODE/A 3A 1N5406
80011291		DIODE/A 3A/400V RG4()
80001171		DIODE/A 5TUZ47C (TOSHIBA)
80009261		DIODE/A RP3F(A+K) SANKEN
80000451		DIODE/T 1/2W 1SS83
EJAC0017		DIODE/T 1A 1N4936
EJAC0018		DIODE/T 1A 1N4937
EJA20003		DIODE/T 1A BA159
80000131		LED L-59GH/1GYC
EKA00603		ZEN DIODE 1/2W(T) 6B1 (HITACHI)
EKA0180B		ZEN DIODE 1/2W(T) HZS 18-2(HITACHI)

SYMBOL	PART NO	DESCRIPTION
POWER CORD	80001631	POWER CORD 3P 1.8 NON-SHIELD COLOR SG8508
CABLE	80012051	SIGNAL CABLE 20276 1.5M FOR PC+5V
TH101	80000801	THERMISTOR NTCR SK054 13.3mm
TH102	80005821	THERMISTOR PTCR 4.5ohm
X701	EM012004	X TAL 49U 12MHz
*** APPEARANCE PARTS ***	***	***
	10100594	CABINET BACK
	10101341	CABINET FRONT
	10101332	CABINET FRONT ASSY
	17000301	CUSHION PIECE(BACK)
	17000291	CUSHION SHEET
	17000451	CUSHION SHEET
	11000331	REVOLVING STAND ASSY
	11000251	REVOLVING STAND(B)(94HB)
	11000361	REVOLVING STAND(B)(94HB)
	11000362	REVOLVING STAND(B)(94HB)
	11000261	REVOLVING STAND(T)(94HB)
	11000262	REVOLVING STAND(T)(94HB)
*** PRINTED & PACKING MATERIALS ***	***	***
B/C LABEL	13201101	CARTON BOX (AS75F-1)
	15000971	NAME PLATE INSTRUCTION (AS75F-1)
	15500712	OWNERS MANUAL (AS75F-3)
	13400521	POLYLON(B)CARTON
	13400511	POLYLON(T)CARTON
*** RESISTORS ***	***	***
R156	FA330159	CARBON 1/2W(T) 5% 1.5ohm
R325	FA330182	CARBON 1/2W(T) 5% 1.8Kohm
R114	FA330104	CARBON 1/2W(T) 5% 100Kohm
R287	FA330101	CARBON 1/2W(T) 5% 100ohm
R365	FA330154	CARBON 1/2W(T) 5% 150Kohm
R385	FA330150	CARBON 1/2W(T) 5% 15ohm
R182	FA330102	CARBON 1/2W(T) 5% 1Kohm
R367	FA330105	CARBON 1/2W(T) 5% 1Mohm
R417	FA330229	CARBON 1/2W(T) 5% 2.2ohm
R414	FA330331	CARBON 1/2W(T) 5% 330ohm
R30L	FA330470	CARBON 1/2W(T) 5% 47ohm
R308	FA330561	CARBON 1/2W(T) 5% 560ohm
R101	FA330684	CARBON 1/2W(T) 5% 680Kohm

SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION
R292	R725		FA240101	CARBON 1/4W(T) 5% 100ohm	R213	R233	R253	FA040391	CARBON 1/8W(T) 5% 390ohm
R206			FA240103	CARBON 1/4W(T) 5% 10Kohm	R713			FA040393	CARBON 1/8W(T) 5% 39Kohm
R10A		R31F	FA240113	CARBON 1/4W(T) 5% 11Kohm	R224	R30V		FA040302	CARBON 1/8W(T) 5% 3Kohm
R392			FA240154	CARBON 1/4W(T) 5% 150Kohm	R119	R129	R148	FA040472	CARBON 1/8W(T) 5% 4.7Kohm
R220	R240	R260	FA240151	CARBON 1/4W(T) 5% 150ohm	R173	R204	R282		
R163	R30U	R31E	FA240102	CARBON 1/4W(T) 5% 1Kohm	R291	R383	R391		
R609			FA240222	CARBON 1/4W(T) 5% 2.2Kohm	R402	R403	R602		
					R605	R610	R701		
R118			FA240203	CARBON 1/4W(T) 5% 20Kohm	R704	R710	R712		
R393			FA240224	CARBON 1/4W(T) 5% 220Kohm	R716	R717	R718		
R278	R280	R290	FA240223	CARBON 1/4W(T) 5% 22Kohm	R719	R722	R728		
R30X					R729	R730	R733		
R116			FA240271	CARBON 1/4W(T) 5% 270ohm	R768	R769	R770		
R30T			FA240332	CARBON 1/4W(T) 5% 3.3Kohm	R739	R740	R771	FA040471	CARBON 1/8W(T) 5% 470ohm
					JP1	R30P	R359	FA040473	CARBON 1/8W(T) 5% 47Kohm
R104			FA240330	CARBON 1/4W(T) 5% 33 ohm	VR201	VR202			
R108	R286		FA240334	CARBON 1/4W(T) 5% 330Kohm	R109	R115		FA040470	CARBON 1/8W(T) 5% 47ohm
R117			FA240390	CARBON 1/4W(T) 5% 39ohm	R294	R295	R336	FA040562	CARBON 1/8W(T) 5% 5.6Kohm
R343	R350		FA240472	CARBON 1/4W(T) 5% 4.7Kohm	R390			#N/A	
R107			FA240564	CARBON 1/4W(T) 5% 560Kohm	R303			FA040561	CARBON 1/8W(T) 5% 560ohm
					R386			FA040623	CARBON 1/8W(T) 5% 62Kohm
R126			FA240681	CARBON 1/4W(T) 5% 680ohm	R319			FA040683	CARBON 1/8W(T) 5% 68Kohm
R30H	R30J		FA240754	CARBON 1/4W(T) 5% 750Kohm	R201			FA040680	CARBON 1/8W(T) 5% 68ohm
R322			FA040122	CARBON 1/8W(T) 5% 1.2Kohm	R113	R382		FA040752	CARBON 1/8W(T) 5% 7.5Kohm
R387			FA040132	CARBON 1/8W(T) 5% 1.3Kohm	R212	R232	R252	FA040750	CARBON 1/8W(T) 5% 75ohm
R205	R338	R714	FA040152	CARBON 1/8W(T) 5% 1.5Kohm	R284			FA040821	CARBON 1/8W(T) 5% 820ohm
R703			FA040182	CARBON 1/8W(T) 5% 1.8Kohm	R150	R157	R175	80002031	FUSEABLE RES 1/2W(A)M 0.22ohm
R155	R168	R31C	FA040104	CARBON 1/8W(T) 5% 100Kohm	R297			FB910229	FUSIBLE MF RES 1/4W 2.2ohm J
R327	R340	R373			R31O			FB241181	METAL 1/4W(T) 1% 1.18Kohm
R375					R31T			FB241053	METAL 1/4W(T) 1% 105K
R202	R203	R208	FA040101	CARBON 1/8W(T) 5% 100ohm	R31U			FB241202	METAL 1/4W(T) 1% 12Kohm
R209	R221	R241							
R261	R306	R30N			R389			FB241372	METAL 1/4W(T) 1% 13.7Kohm
R30Y	R31X	R331			R366			FB241503	METAL 1/4W(T) 1% 150Kohm
R332	R706	R707			R149			FB241001	METAL 1/4W(T) 1% 1Kohm
R724	R727	R742			R410	R412		FB242501	METAL 1/4W(T) 1% 2.5Kohm
R743	R761	R762			R31R			FB242701	METAL 1/4W(T) 1% 2.7Kohm
					R361			FB242002	METAL 1/4W(T) 1% 20Kohm

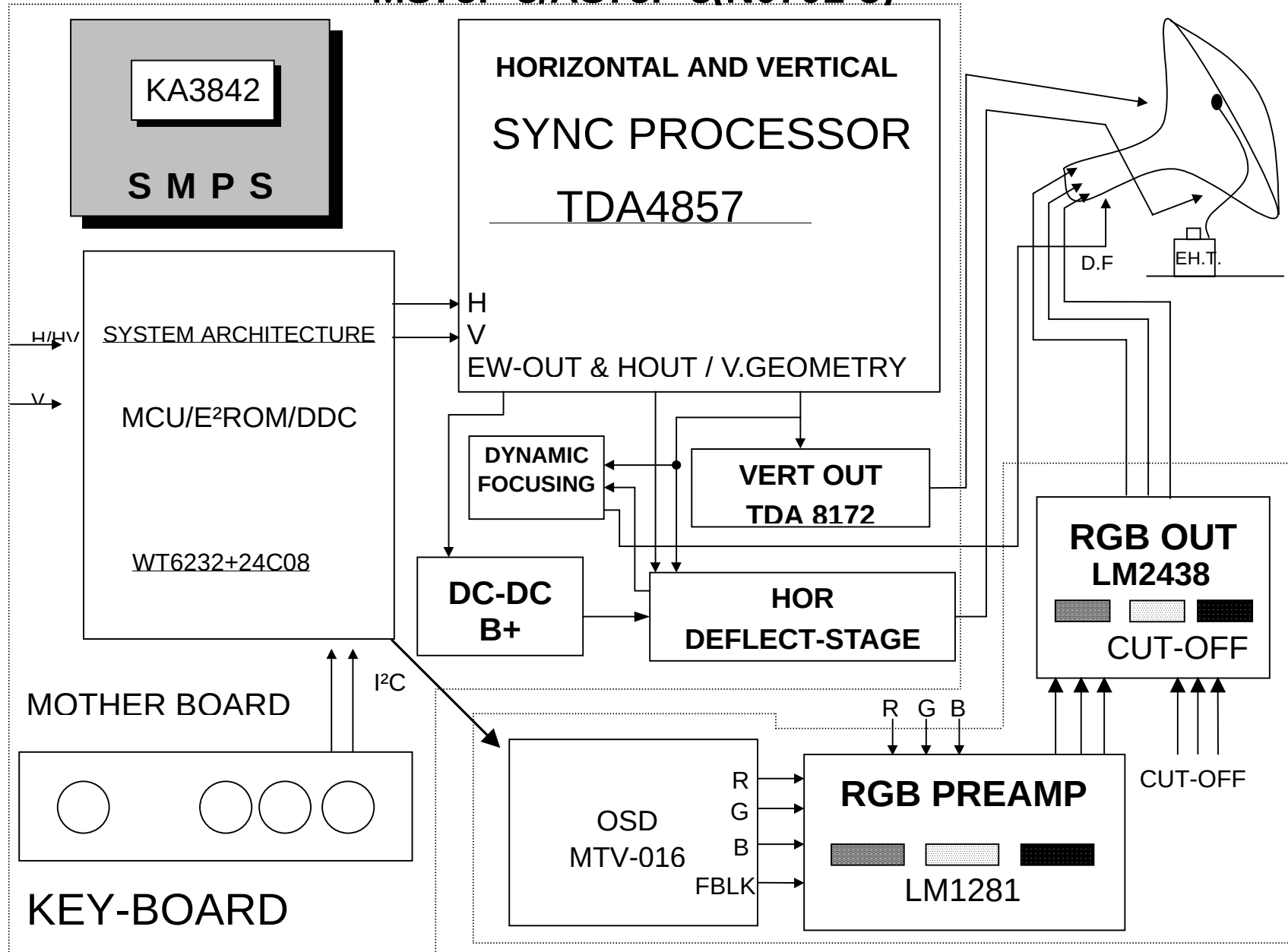
SYMBOL			PART NO	DESCRIPTION	SYMBOL			PART NO	DESCRIPTION
R110	R122	R161	FA040103	CARBON 1/8W(T) 5% 10Kohm	R31N			FB242202	METAL 1/4W(T) 1% 22Kohm
R167	R288	R293			R344			FB242552	METAL 1/4W(T) 1% 25.5Kohm
R307	R30M	R30O			R711			FB243481	METAL 1/4W(T) 1% 3.48Kohm
R310	R318	R330			J26			FB244702	METAL 1/4W(T) 1% 47Kohm
R345	R360	R368							
R369	R377	R379			R158			FB240470	METAL 1/4W(T) 1% 47ohm
R601	R604	R612			R348			FB245541	METAL 1/4W(T) 1% 5.54Kohm
R613	R709	R720			R31L			FB245102	METAL 1/4W(T) 1% 51Kohm
R736					R388			FB245490	METAL 1/4W(T) 1% 549ohm
R317			FA040106	CARBON 1/8W(T) 5% 10Mohm	R349			FB245602	METAL 1/4W(T) 1% 56Kohm
R353			FA040154	CARBON 1/8W(T) 5% 150Kohm	R151			FB246242	METAL 1/4W(T) 1% 62.4Kohm
R154	R357		FA040153	CARBON 1/8W(T) 5% 15Kohm	R210	R230	R250	FB247509	METAL 1/4W(T) 1% 75ohm
R362			FA040150	CARBON 1/8W(T) 5% 15ohm	R411	R413		FB248201	METAL 1/4W(T) 1% 8.2Kohm
R112	R123	R132	FA040102	CARBON 1/8W(T) 5% 1Kohm	R169	R313	R314	FB910010	METAL 1/4W(T) 5% 1ohm
R289	R301	R401			R351				
R603					R415			FB470119	MOF 1W/M(A) 5% 1.1ohm
R159	R296	R315	FA040105	CARBON 1/8W(T) 5% 1Mohm					
R395					R128	R606		FB470100	MOF 1W/M(A) 5% 10ohm
					R160			FB470153	MOF 1W/M(A) 5% 15Kohm
R608	R708		FA040222	CARBON 1/8W(T) 5% 2.2Kohm	R421			FB470109	MOF 1W/M(A) 5% 1ohm
R305			FA040225	CARBON 1/8W(T) 5% 2.2Mohm	R312			FB470270	MOF 1W/M(A) 5% 27ohm
R374			FA040204	CARBON 1/8W(T) 5% 200Kohm	R422			FB470339	MOF 1W/M(A) 5% 3.3ohm
R223	R243	R263	FA040224	CARBON 1/8W(T) 5% 220Kohm					
R30C	R30E	R339			R103			FB470680	MOF 1W/M(A) 5% 68ohm
R270			FA040221	CARBON 1/8W(T) 5% 220ohm	R31A			FB480100	MOF 1W/M(B) 5% 10ohm
					R105			FB560248	MOF 2W/M(A) 5% 0.24ohm
R127	R130	R611	FA040223	CARBON 1/8W(T) 5% 22Kohm	R354			FB560182	MOF 2W/M(A) 5% 1.8Kohm
R726					R125			FB560103	MOF 2W/M(A) 5% 10Kohm
R30G			FA040220	CARBON 1/8W(T) 5% 22ohm					
R363			FA040244	CARBON 1/8W(T) 5% 240Kohm	R335			FB560151	MOF 2W/M(A) 5% 150ohm
R364			FA040274	CARBON 1/8W(T) 5% 270Kohm	R302			FB560222	MOF 2W/M(A) 5% 2.2Kohm
R244	R264		FA040202	CARBON 1/8W(T) 5% 2Kohm	R316			FB560331	MOF 2W/M(A) 5% 330ohm
					R106			FB570563	MOF 2W/M(B) 5% 56Kohm
R31P	R731		FA040332	CARBON 1/8W(T) 5% 3.3Kohm	R309			FB710150	MOF 3W/M(A) 5% 15ohm
R358			FA040334	CARBON 1/8W(T) 5% 330Kohm					
R102	R31H	R31J	FA040331	CARBON 1/8W(T) 5% 330ohm	R311			FB710109	MOF 3W/M(A) 5% 1ohm
R715	R721				R304			80011181	RESISTOR FUSEABLE 1/2W(A)(M) 22ohm
R219	R239	R259	FA040333	CARBON 1/8W(T) 5% 33Kohm	R394			FC030508	WOUND RES 1W(A) 5% 0.5ohm
R328					R111			FC110158	WOUND RES 2W(A) 5% 0.15ohm
R211	R231	R251	FA040330	CARBON 1/8W(T) 5% 33ohm					

*** CAPACITORS ***				
C707	C708		GB610152	CERAMIC SL/T 100P/50V J

SYMBOL				PART NO	DESCRIPTION	SYMBOL				PART NO	DESCRIPTION
C353	C706	SG301		GB633152	CERAMIC SL/T 330P/50V J	C355	C332		GFB75482	PLASTIC MPP/A 0.75u/250V J	
C705			GB633052	CERAMIC SL/T 33P/50V J		GFD304E2			PLASTIC MPPS/A 0.3u/400V J (PILKOR)		
C276			80011281	CERAMIC SPARK CAPS 1KV +1500V~900V							
C277			GB7102H3	CERAMIC Y5P(B)/T 1000P/1KV K	C307	GFD47482			PLASTIC MPPS/A 0.47u/250V J (MYLAR)		
C275	C334	C357		GB7102F3	CERAMIC Y5P(B)/T 1000P/500V K	C271	C347	C401	GE210252	PLASTIC PEI/T 0.001u/50V J	
C297						C40A	C413		GE222252	PLASTIC PEI/T 0.0022u/50V J	
C605				GB710253	CERAMIC Y5P(B)/T 1000P/50V K	C111	C320	C407	GE233252	PLASTIC PEI/T 0.0033u/50V J	
C127				GB7101H3	CERAMIC Y5P(B)/T 100P/1KV K	C601			GE268252	PLASTIC PEI/T 0.0068u/50V J	
C124	C304			GB7331H3	CERAMIC Y5P(B)/T 330P/1KV K	C128	C142	C295	GE210352	PLASTIC PEI/T 0.01u/50V J	
C272	C341			GB7471F3	CERAMIC Y5P(B)/T 470P/500V K	C296	C327	C363			
C110				GB747153	CERAMIC Y5P(B)/T 470P/50V K	C603					
C204	C205	C267		GB210458	CERAMIC Y5V/T 0.1u/50V Z	C123	C348		GE222352	PLASTIC PEI/T 0.022u/50V J	
C282	C283	C284				C316	C343	C364	GE247352	PLASTIC PEI/T 0.047u/50V J	
C346	C350	C702				C306	C317	C328	GE210452	PLASTIC PEI/T 0.1u/50V J	
C709						C358	C361				
C106				GB8103F5	CERAMIC Z5U(E)/T 0.01u/500V M	C319			GED562M2	PLASTIC PPN/A 5600P/800V J	
C321				GB9103H8	CERAMIC Z5V(F)/T 0.01u/1KV Z	C318			GFC622J2	PLASTIC PPS/A 6200P/2KV J	
C310	C331			GB9103F8	CERAMIC Z5V(F)/T 0.01u/500V Z	C105			GKA227E5	POWER ELECT 85oC 220u/400V M	
C112	C149	C201		GB910358	CERAMIC Z5V(F)/T 0.01u/50V Z	C101			GJ047400	SAFETY X-CAP 0.47u/275V M	
C202	C203	C207				C102			GJC102E5	SAFETY Y-CAP/D 1000P/400V M	
C231	C270	C280				C103	C104	C146	GJH102E5	SAFETY Y-CAP/S 1000P/400V M	
C281	C291	C294				C154					
C299	C301	C409									
C712	C724										
C277				GB9332H8	CERAMIC Z5V(F)/T 3300P/1KV Z						
C120	C138			GA110775	ELECT 105oC/A 100u/100V M TK						
C214	C234	C254		GA210575	ELECT 105oC/T 1u/100V M						
C288				GAB22675	ELECT 105oC/T 22u/100V M						
C428				GA347485	ELECT 85oC/T 0.47u/250V M						
C122				GA310815	ELECT 85oC/T 1000u/10V M						
C372	C703			GA310725	ELECT 85oC/T 100u/16V M						
C308	C410			GA310745	ELECT 85oC/T 100u/35V M						
C113	C116	C143		GA310655	ELECT 85oC/T 10u/50V M						
C150	C206	C210									
C230	C250	C292									
C293	C337	C338									
C604	C711	C726									
C727	C728										

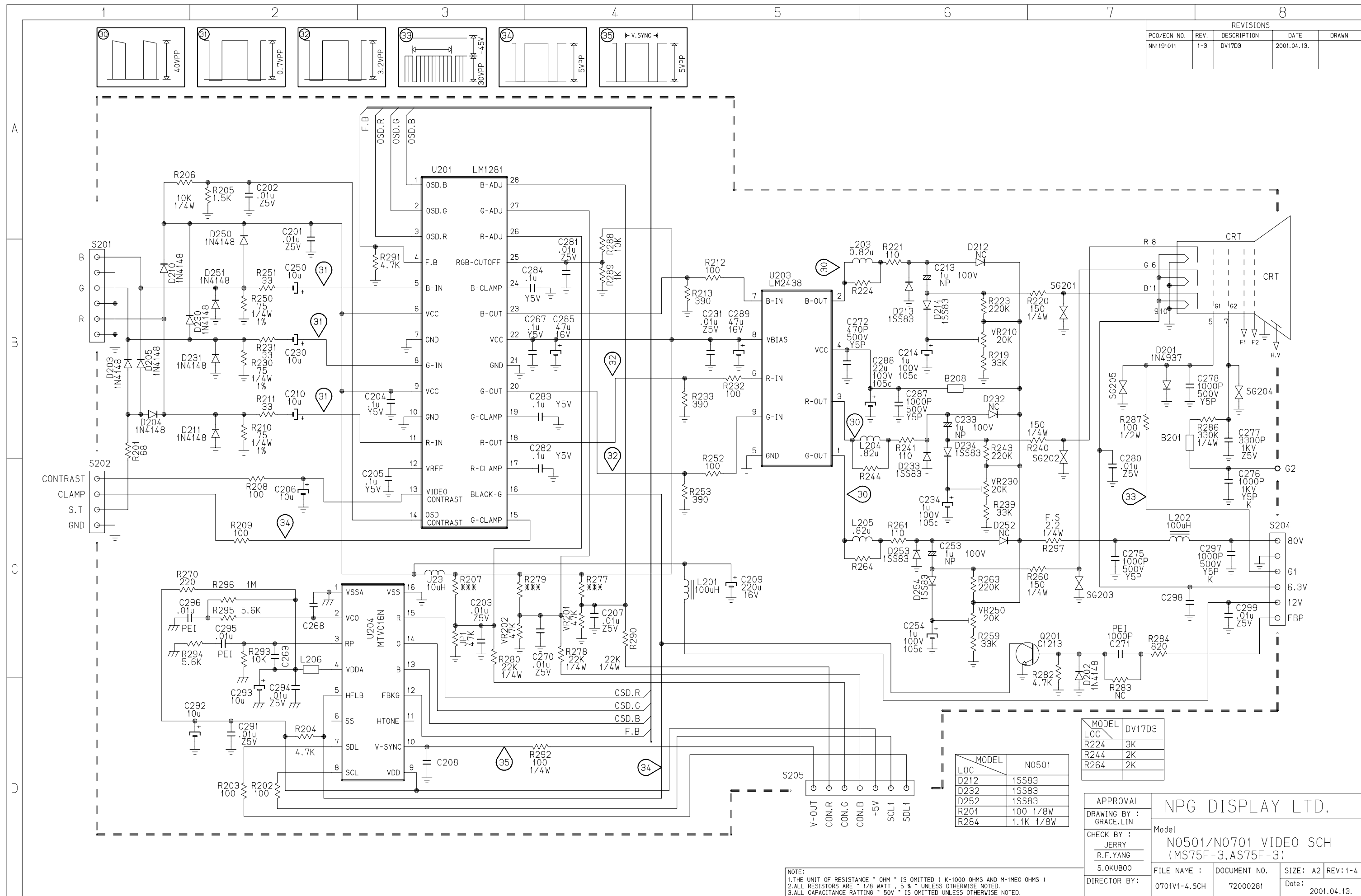
SYMBOL			PART NO	DESCRIPTION
C336	C340	C352	GA310555	ELECT 85oC/T 1u/50V M
C701	C710			
C339	C704		GA322555	ELECT 85oC/T 2.2u/50V M
C209			GA322725	ELECT 85oC/T 220u/16V M
C109			GA322645	ELECT 85oC/T 22u/35V M
C311			GA322655	ELECT 85oC/T 22u/50V M
C344			GA347585	ELECT 85oC/T 4.7u/250V M
C309			GA347555	ELECT 85oC/T 4.7u/50V M
C136	C330		GA347725	ELECT 85oC/T 470u/16V M
C108	C137	C151	GA347625	ELECT 85oC/T 47u/16V M
C285	C289	C335		
C725				
C368			GA347635	ELECT 85oC/T 47u/25V M
C354			GA347645	ELECT 85oC/T 47u/35V M
C313			GA347655	ELECT 85oC/T 47u/50V M
C121	C408		GAH10825	ELECT CAP 105oC/T 1000u/16V M TK
C119			GAH22675	ELECT CAP 105oC/T 22u/100V M TK
C156			GAH47555	ELECT CAP 105oC/T 4.7u/50V M TK
C139	C404		GAH47725	ELECT CAP 105oC/T 470u/16V M TK
C213	C233	C253	GA410575	ELECT NP/T 1u/100V M
C312			GF215252	MEF CAP BOX 0.0015u/50V J
C315			GF210252	MEF CAP BOX 0.001u/50V J
C115			GF233262	MEF CAP BOX 0.0033u/63V J
C366			GF256252	MEF CAP BOX 0.0056u/50V J
C362			GF282252	MEF CAP BOX 0.0082u/50V J
C365			GF210352	MEF CAP BOX 0.01u/50V J
C360			GF215452	MEF CAP BOX 0.15u/50V J
C314			GF210452	MEF CAP BOX 0.1u/50V J
C114			GF210462	MEF CAP BOX 0.1u/63V J
C403			GF222452	MEF CAP BOX 0.22u/50V J
C345			GFA10382	PLASTIC MPE/A 0.01u/250V J
C329			GFA15482	PLASTIC MPE/A 0.15u/250V J
C333			GFA10582	PLASTIC MPE/A 1u/250V J
C351			GFB15482	PLASTIC MPP/A 0.15u/250VJ
C356			GFB30482	PLASTIC MPP/A 0.3u/250V J
C325			GFB47482	PLASTIC MPP/A 0.47u/250V J

MS75F-3/AS75F-3(N0701-3)

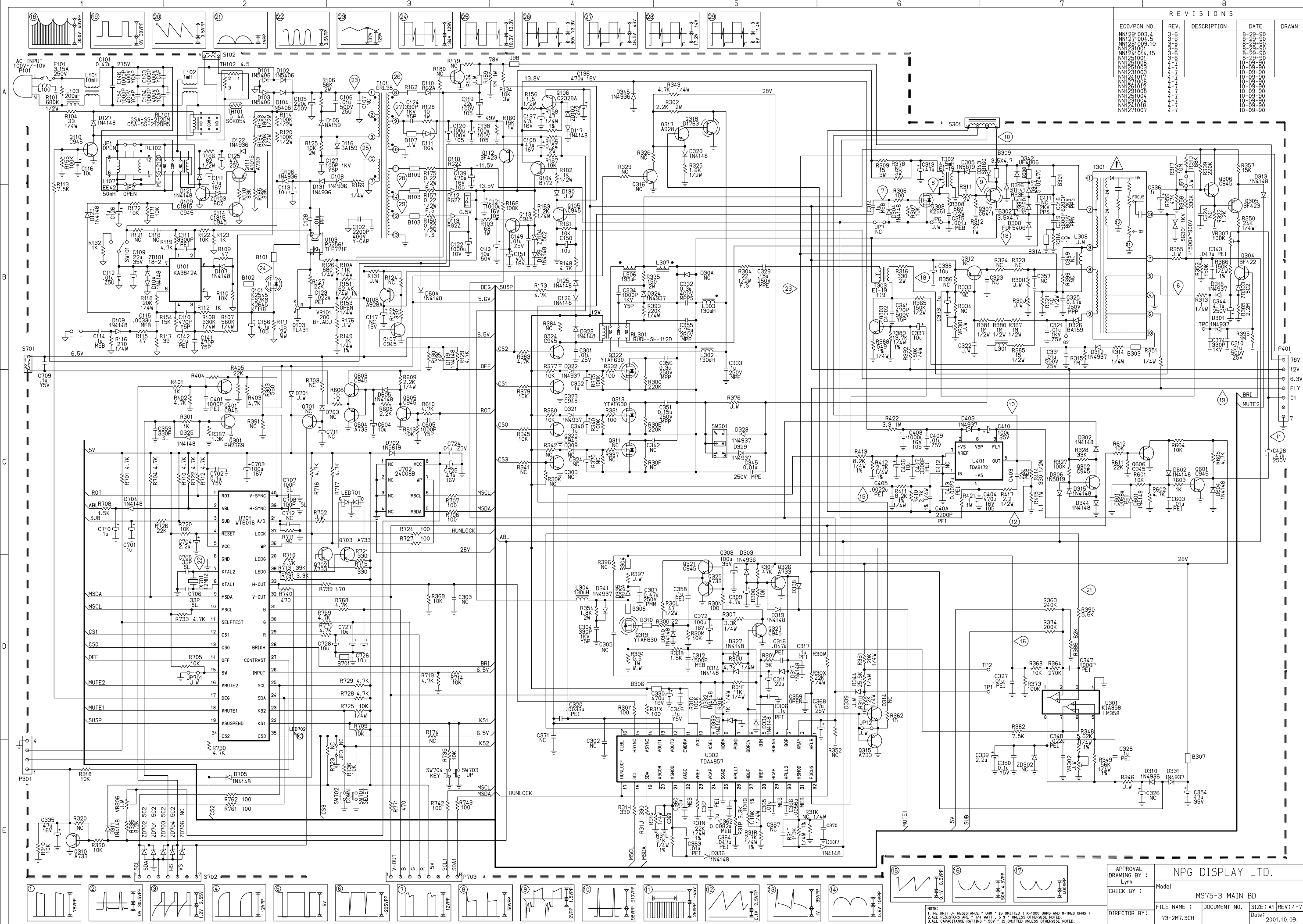


BLOCK DIAGRAM

MODEL MS75F-3 / AS75F-3 VIDEO BOARD SCHEMATIC DIAGRAM



MODEL MS75F-3 MAIN BOARD SCHEMATIC DIAGRAM



MODEL AS75F-3 MAIN BOARD SCHEMATIC DIAGRAM

